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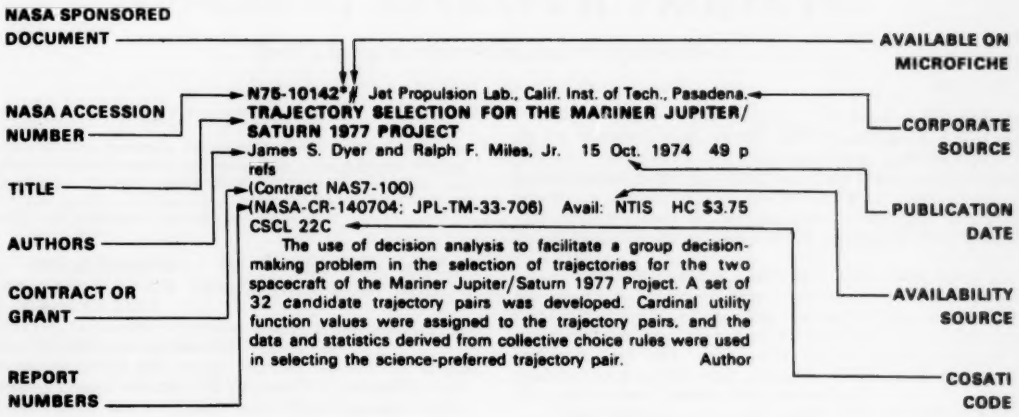
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N76-10142* # Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
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TRAJECTORY SELECTION FOR THE MARINER JUPITER/ SATURN 1977 PROJECT
TITLE
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
PUBLICATION DATE
AUTHORS
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CONTRACT OR GRANT
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
AVAILABILITY SOURCE
CSCL 22C
REPORT NUMBERS
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author
COSATI CODE

ON-GOING RESEARCH PROJECTS

This is a listing of research projects—not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, DEVELOPMENT OF DRONE/REMOTELY PILOTED VEHICLE AIR CUSHION LANDING SYSTEM (ACLS) - GROUND TEST

J. PECKHAM, Government Aircraft Factories, *Melbourne, Victoria, Australia* (DF134410; F44620-75-C-0014)

Present parachute and mid-air retrieval methods for drones and remotely piloted vehicles (RPV) incur high operating costs, restrict sortie rates, and limit operational flexibility and mobility. The objective of this work unit is to ground and wind tunnel test the AFFDL- developed air cushion takeoff and recovery system (ACTS and ACRS) on a Jindivik drone. The successful development of the ACTS and ACRS will enable reductions of 90 percent for recovery costs and 80 percent for turn-around time. In addition, a new dimension will be provided for RPV/drone deployment flexibility and mobility.

The Australian government aircraft factories (GAF) will equip a flightworthy Jindivik drone aircraft with the two air cushion systems developed by AFFDL. Ground tests will be conducted by GAF at Avalon Field. Wind tunnel testing will be done at the Australian government's Aeronautical Research Laboratory (ARL) in Melbourne, Australia. A one- quarter scale model Jindivik drone equipped with a simulated one-quarter scale air cushion recovery system (ACRS) in the deployed state will be tested in a 9 by 7 foot wind tunnel. Test emphasis will be placed on stability during landing.

Supporting agency address information: AF Flight Dynamics Laboratory FEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0002, ADVANCED TECHNOLOGY HELICOPTER LANDING GEAR

R.E. GOODALL, Summa Corporation, *Culver City, California* 90230 (DA0D3992; DAAJ02-75-C-0028)

To design, fabricate and laboratory test a crashworthy landing gear made of composite materials for a helicopter in the 15,000 pound class.

Various practical design concepts will be analyzed and presented to the government for selection. The most viable concept will be pursued, fabricated of composite materials and, finally, the completed wheeled- type landing gear will be laboratory tested to determine its structural worthiness of satisfying the requirements of MIL-S-8698 and MIL-STD- 1290.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0003, INVESTIGATION OF HELICOPTER COMPONENT FAILURE PROGNOSIS

J.J. REIS, Northrop Corporation, *Hawthorne, California* 90250 (DA0D3989; DAAJ02-75-C-0019)

The objective of this program is to obtain and analyze data on the relationship of specific sensory outputs to a helicopter gearbox's condition and to investigate their applicability on the determination of the remaining useful life of the component. The efforts to be performed are intended to complement the completed program for investigation of helicopter component failure prognosis under USAAMRDL contract number DAAJ02-72-C-0118.

Conduct mechanical component tests using government-furnished UH-1 series 90 degrees gearboxes in an improved test cell facility capable of providing continuous data collection. Ten gearboxes with incipient bearing failures will be tested over a total test period of 5000 hours. The data shall be processed and analyzed to establish valid predictions of gearbox failure time, time of maximum gearbox deterioration, etc.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0004, COMPARISON OF MILITARY AND COMMERCIAL DESIGN-TO-COST AIRCRAFT PROCUREMENT AND OPERATIONAL SUPPORT PRACTICES

L. CARLYLE, McDonnell Douglas Corporation, *Long Beach, California* 90808 (DF135610; F33615-75-C-3139)

HQ AFSC/AV directed this effort in support of project ACE as a parallel study to that presently being conducted by Boeing Aerospace Company, Contract F33615-74-3100, same title. Experience dictates that comparison of the commercial approach to design-to-cost management of an aircraft program with that employed by the DOD will yield many proven techniques and practices which can be directly applied to military weapon system procurement. Overall objective of this study will be to determine those aspects of commercial aircraft procurement and operational support which, if applied to the DOD environment, would result in significant reductions in the unit fly away and life cycle support costs of future USAF aircraft.

A program will be implemented to examine, analyze and conduct a comparative evaluation of all phases of the system life cycle, i.e., planning, design, development, manufacturing/production, test and evaluation, and operations and logistic support of selected military and commercial aircraft programs. This will be accomplished to identify those differences in techniques and practices which result in lower acquisition and support costs for commercial aircraft, and conversely, higher costs for military aircraft. Analyses and evaluations derived will be used to develop recommendations regarding the feasibility and practicality of applying high payoff commercial practices to military aircraft programs to achieve reduced costs.

Supporting agency address information: AF Flight Dynamics Laboratory PTC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0005, VORTEX COMBUSTION

M. GERSTEIN, Univ. of Southern California, School of Engineering, *Los Angeles, California* 90007 (AFOSR-70-1918)

Description: Future aerospace vehicle and missile propulsion for effective weapon delivery at subsonic, supersonic, hypersonic, and multi-mode operation require versatile combustion systems.

This research encompasses unresolved problems associated with ignition, subsonic and supersonic combustion and the various transient processes involved in multi-mode operation. Results will provide understanding of the complex processes involved and guide engineering design, development and control of practical combustors for these engines. This program involves the study of ignition and combustion of dense hydrocarbon fuels and metal additives in the turbulent vortex flow associated with subsonic, supersonic, hybrid and multi-mode combustors. The shock-free, normal shock and oblique shock environments are treated. Particular emphasis is given to the vortex centrifugal effects for dense fuel drops and slurries. The effect of vortex centrifugation on the transonic stability corridor will be investigated. As has been shown in rocket systems, the effect of particle motion on combustion oscillations may be important and will be investigated. Experiments will be carried out in the combustion tunnel to develop quantitative data on recirculation and vortex behavior during the stabilization process, laser Schlieren, high speed photography, and gas chromatography. A theoretical model of burning particles undergoing separation will be developed. The stability corridor and regions of combustion oscillations will be defined in terms of practical combustor environments and an engineering model will be presented for system analysis.

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0006, STUDY OF TRANSONIC FLOW FIELDS ABOUT AIRCRAFT WITH APPLICATION TO EXTERNAL STORES
S.S. STAHARA, Nielsen Engin. & Research Inc., *Mountain View, California* 94040 (DF040660; F44620-75-C-0047)

The delivery of external stores from military aircraft at transonic speeds presents many practical problems that can be circumvented in part if detailed knowledge of the flow field is available. Of prime interest to the engineer is the ability to predict the trajectories of external stores released at transonic speeds. Methods are now available to calculate the transonic flow fields about wing-body combinations. This research will extend this ability to wing-body combinations carrying external stores. The purpose will be to develop a computational program which will permit calculation of flow fields around wing-body combinations with external stores, and thus permit calculation of trajectories.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0007, CONCEPTUAL FUSELAGE DESIGN FOR ADVANCED COMPOSITE V/STOL AIRCRAFT
F.W. KROHN, General Dynamics Corporation, *San Diego, California* 92112 (DN581066; N62269-74-C-0471)

Develop low-cost, lightweight composite fuselage designs for V/STOL aircraft. This work is in support of work unit HJ202, 'Development of Composite Structure for Naval Aircraft,' Agency Accession No. DN133038.

Conduct conceptual composite fuselage design investigations for the Model 200A V/STOL aircraft. Address the wing-fuselage attachment design problem when both wing and fuselage are of composite construction. Develop new design concepts and manufacturing procedures directed specifically at cost-effective utilization of composite materials in aircraft structures. Make layout drawings, production plans, and production costs analyses and determine performance payoffs for use in parametric analyses to determine composite utilization yielding optimum overall payoff.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30331), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0008, TE MODE AIRCRAFT RECEPTION STUDY
R.N. GHOSE, Amer. Nucleonics Corporation, *Woodland Hills, California* 91364 (DF243230; F19628-75-C-0028)

AF function - command/control communications. Deficiency - lack of range for survivable VLF/LF communications. How research contributes - study to determine if TE mode can be received on board aircraft to improve VLF/LF communications systems range.

Supporting agency address information: AF Cambridge Research Laboratories LI, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0009, SELECTED COMPONENTS FOR EASE OF REPAIR, ARMY HELICOPTERS
T.N. COOK, Kaman Aerospace Corporation, *Bloomfield, Connecticut* 06002 (DA0D3993; DAAJ02-75-C-0029)

The objective of this effort is to analyze repair actions associated with specified aircraft components and to develop improved design concepts and principles.

Repairability problems associated with the following components, as applicable to current inventory Army aircraft, shall be analyzed: (1) main rotor hub; (2) transmission; (3) swashplate and support assembly; (4) tail rotor gearbox/intermediate gearbox; (5) hydraulic servo actuator; (6) starter generator/DC generator/AC generator; (7) tail rotor hub assembly; and (8) APP/APU systems. Those deficiencies which require development of new design concepts shall be candidates for Task II of this effort. Task II will be the development of design concepts and principles to provide solutions for those selected deficiencies.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0010, TRANSPORTATION IMPACT ZONE - LEGISLATIVE POLICY ALTERNATIVES
UNKNOWN, U.S. Dept. of Transportation, Off. of Envir. Safety, *Washington, District of Columbia* 20590 (045578 (HRB NO.))

The objective of this contract is to identify and develop alternative public policy and/or legislative initiatives (other than vehicle controls, facility location or design, or other 'within right-of-way' actions) which would ameliorate adverse impacts and take advantage of beneficial impacts on individuals and institutions in areas adjacent to key airport, highway, and mass transit facilities.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - U.M.T.A.

1.0011, EXTERNAL PROJECTILES AND NUCLEAR POWER STATIONS - EVALUATING THE EFFECTS OF AN AIRPLANE CRASH
UNKNOWN, Electricite De France, *76008 Paris, France*

The goal of this project is: a. To evaluate the probability and consequences of an airplane or missile crashing into a nuclear power plant located close to a civilian airport, a military air base, a recreational airport, or an industrial area; b. To estimate damages resulting from such an event.

Addenda: Supporting agency and Performing organization - Electricite de France, Direction des Etudes et Recherches.

SUPPORTED BY Electricite De France - Paris

1.0012, PREPARATION OF A MANUAL DESCRIBING DATA COLLECTION AT AIR CARRIER AIRPORTS FOR URBAN TRANSPORTATION STUDIES
R.J. TOBER, Barton Aschman Associates Inc., *Chicago, Illinois* 60626 (038224 (HRB NO.))

The types of problems to be solved by this project are ground movement by air passengers, employees, casual visitors, and passenger- related visitors, and a multitude of vehiclar operations including private automobiles, rental automobiles, taxis, limousines, and trucks, transit operations that may be present at a given airport. Because transit operations are directly affected by the related forms of ground movement, it is necessary to understand the interrelationship between transit and those other forms of transportation. Furthermore, transit operations may be either intramural or external to internal.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

1.0013, BI-DIRECTIONAL MULTI-STATION COMMAND/INFORMATION BUS
N.P. MURARKA, I I T Research Institute, *Chicago, Illinois* 60616 (DF133770; F33615-75-C-3100)

Military aircraft may experience lightning flashes in all operations, and hostile nuclear weapon environments, such as electromagnetic pulse, gamma and X-radiation charged particles, and neutrons, during wartime. These lightning and nuclear weapon environments may induce voltage or current noise into electronic flight control system signal/command lines and/or may cause currents damaging to semiconductor components. Excess noise or damaged semiconductors can render the flight control system inoperative, resulting in drastically reduced aircraft performance and in certain configurations, aircraft loss. This program is to provide resistance to effects of the aforementioned environments on flight control, by use of microwave information transmission, dielectric waveguides, selective on-board signal routing, and selective signal discrimination. Concepts developed will provide flight control information systems design criteria which mitigate effects of the lightning and nuclear weapon environments on combat aircraft.

It is planned that a comprehensive flight control information system will be specified for the class of vehicle represented by the F- 16 aircraft which will be resistant to maleffect from lightning or electromagnetic pulse or transient radiation environments through development of a selective routing scheme employing frequency discriminatory coupling and microwave carriers with a dielectric information bus. Further, excess capacity of the defined system will be allocated among aircraft avionic information transmission requirements.

Supporting agency address information: AF Flight Dynamics Laboratory FGL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0014, HAC SIMULATOR EVALUATION
J.M. SINNETT, McDonnell Douglas Corporation, *St. Louis, Missouri* 63166 (DF317410; F33615-75-C-5087)

This effort will further evaluate a (previously developed) high- acceleration cockpit design by means of additional fixed-base, manned air combat simulation using experienced military fighter pilots.

Three advanced fighter designs are to be compared using real-time, interactive manned simulation of individual air-to-air combat engagements. Four pilots will 'fly' a series of engagements in the three simulated aircraft using either a con-ventional cockpit design or a high acceleration cockpit design, with both simulated cannon and missile armaments available. Previous simulation activity, performed under contract F33615-73-C-0565, will be improved and expanded by incorporating a refined cockpit design, an improved primary controller mechanization, and improved visual simulation quality. Weapon system effectiveness estimates will be derived and analyzed on the basis of the engagements' characteristics.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0015, STUDY TO PROBE SAFETY OF CLEANER PISTON ENGINES
UNKNOWN, U.S. Dept. of Transportation, Federal Aviation Admin., *Atlantic City, New Jersey* 08405 (082317 (HRB NO.))

FAA has contracted with two manufacturers of general aviation aircraft engines to determine if safety would be affected by the modifications necessary to reduce exhaust emissions in existing piston engines to meet the Environmental Protection Agency's 1979 emissions standards. FAA, which certificates all civil aircraft engines and their modifications, wants to know if changing the fuel/air mixture and engine timing settings would cause engine overheating or other safety problems. Ten engines will be tested--five each by Teledyne Continental and Avco- Lycoming. The tests will be conducted over a 14-month period and supervised by FAA's National Aviation Facilities Experimental Center at Atlantic City, N.J. Contract costs total just over $400,000, of which $250,000 will be reimbursed by National Aeronautics and Space Administration under an interagency agreement.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.A.A.

1.0016, FORMULATION OF LOADS MEASUREMENT, ANALYSIS AND LOAD CRITERIA FOR FLEET AIRCRAFT
J.C. HOUBOLT, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (DN581062; N62269-74-C-0465)

To provide guidance on the overall work effort that should be undertaken by NavAirDevCen in the structures area to ensure a meaningful design criteria from information collected during flight load studies of operational aircraft and simulator aircraft. This contract supports work unit DJ502, Agency Acce sion No. DN833175.

Provide services of experts in the fatigue field to provide answers to questions raised concerning design criteria.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30312), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0017, CALCULATION OF UNSTEADY AERODYNAMIC FORCES IN SUPERSONIC CASCADES BY THE METHOD OF LINEARIZED CHARACTERISTICS
J.E. YATES, Aeronautical Res. Associates, *Princeton, New Jersey* 08540 (DF135200; F33615-75-C-3102)

The objective of this project is to improve reliability and safety of turbine-powered military flight vehicles. Recent designs of high- performance aircraft have indicated a need for more accurate prediction of aeroelastic phenomena inside turbine engines. Cost estimates to eliminate a flutter problem in a fleet of 1000 production engines are as much as $19 million. An accurate flutter prediction method could find the problem before the production phase, thus lowering costs and increasing reliability. This effort will focus on providing the aerodynamics for an accurate AFFDL blade flutter analysis capability to evaluate the flight safety of new turbine-powered aircraft.

The contractor shall apply the method of linearized characteristics to the calculation of unsteady aerodynamic forces on finite two- dimensional supersonic airfoil cascades. The method should be general enough for airfoils of arbitrary vertical translational and rotational degrees of freedom, arbitrary stagger angle, solidity, and location of tunnel walls, with no assumption made of constant interblade phase angle. A second task requires the contractor to incorporate the method into a computer program. Anticipated problems include the task of assuring that the program is compatible with the WPAFB computer facility.

Supporting agency address information: AF Flight Dynamics Laboratory FYS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0018, HOT METAL IR PREDICTION DEVELOPMENT
F. HUSTED, U.S. Navy, Air Propulsion Test Center, *Trenton, New Jersey* 08641 (DN596807)

Assess the validity of the IR prediction routines, and modify as required, to permit prediction of signatures for current and advanced Navy aircraft engines.

Exercise the computer model, installed during FY 1974, and compare the predicted signature levels with measured data acquired at the NAPTC outdoor field test site. Based upon the extent of the agreement between predicted and measured data, recommend updates to further refine signature predictions capability and the accuracy of the modeling procedures.

Supporting agency address information: Naval Air Systems Command, Propulsion Technology Administrator, Washington, D. C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0019, INTEGRATED AUTOMATIC FLIGHT/FIRE CONTROL SYSTEMS (FIREFLY II)
R.A. BELL, General Electric Company, *Binghamton, New York* 13902 (DF135960; F33615-75-C-3143)

Improving the weapon delivery accuracy of tactical fighter aircraft is a critical problem which relates directly to combat effectiveness. The overall objective of this effort is to improve the

delivery accuracy of conventional unguided air-to-air and air-to-ground weapons through integration of the aircraft's flight control and fire control systems. The technical objective of this study is to establish the desirability of integrated flight control/fire control systems by relating each proposed configuration to weapon accuracy. Another objective of the program is to establish the related technology base of flight/fire control systems. The results of this program will be directly applicable to current and future tactical fighter aircraft where improved weapon delivery accuracy will result in lower operating costs and reduced combat losses.

A variety of applicable techniques and configurations for interfacing the flight control and fire control systems will be defined and analyzed for a selected tactical fighter aircraft. Advanced designs such as direct lift and direct side force will also be addressed. Comparative analysis of weapon delivery accuracy for the various automatic and manual systems will be included. Results of the analysis will be confirmed by a detailed piloted simulation effort which utilizes the flying qualities of each aircraft/flight control/fire control configuration.

Supporting agency address information: AF Flight Dynamics Laboratory FGL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0020, INFLATABLE SEAT CUSHION INSERT
F. BLOETSCHER, B.F. Goodrich Company, *Akron, Ohio* 44311 (DF135190; F33615-75-C-0097)

The increase in maneuvering performance at sustained acceleration levels of 8-10 g's in advanced fighter aircraft will depend on the successful development of the high acceleration cockpit (HAC) concept. The HAC requires a seat positioning system to orient the pilot to a semi-supine position reclined to a back angle of 65 degrees to increase pilot tolerance at high g levels. This effort will result in the demonstration of the feasibility of an inflatable seat cushion insert which can be used with conventional ejection seat systems to provide both a normal and reclined seating position.

An inflatable, multi-cell type seat cushion constructed of air-mat type material has been identified as a potential solution to the pilot positioning problem in HAC configured aircraft. Compatibility of this concept with conventional ejection seat systems will be determined by designing and fabricating a prototype unit of an inflatable seat cushion insert and pilot restraint system and by demonstrating a rapid seat cushion deflation technique and the powered retraction of the pilot to the ejection position from the semi-supine HAC position.

Supporting agency address information: AF Flight Dynamics Laboratory FER, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0021, PRELIMINARY DESIGN OF A COMPOSITE WING FOR NAVY V/STOL PROTOTYPE
O.G. ACKER, Rockwell International Corp., *Columbus, Ohio* 43216 (DN581067; N62269-74-C-0577)

To advance fibrous composite aerospace structures technology by the preliminary design of a major structural component representative of new fighter aricraft and to provide the basis for advanced development efforts to demonstrate the practicality of such structures. To support the Navy V/STOL prototype program by focusing on the preliminary design of a lightweight, highly reliable wing assembly with sufficient similarity to the final systems configurations to minimize transition from development to production status. To provide the technical basis, the economic analysis, and (by demonstration) the confidence needed for large-scale commitment of composites to future Navy aircraft structures. this work is in support of work unit HJ 202, 'Development of Composite Structure for Naval Aircraft,' Agency Accession No. DN133038.

Conduct the preliminary design of a full-scale composite wing structure forward of the augmenter for the XFV-12A V/STOL fighter attack prototype. Fabricate one structural test specimen representing this structure betweeen wing stations 60 R/H to 60 L/H and one structural test specimen representing the wing tip structure incorporating the landing gear and vertical fin attachment.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30331), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0022, FABRICATION AND FLIGHT EVALUATION OF A LIGHTWEIGHT HYDRAULIC SYSTEM
J.N. DEMARCHI, Rockwell International Corp., *Columbus, Ohio* 43216 (DN581330; N62269-74-C-0511)

Provide the development of detail components for LHS (lightweight hydraulic system) for future application to advance naval aircraft design as VFX(V/STOL) and VAX. Fabricate seal test fixture and LHS aileron power actuator. Assemble 8000 psi aircraft hydraulic system and conduct endurance testing of system. This contract supports work unit DK601, Agency Accession No. DN833208.

Fabricate seal test fixture and aileron power actuator and assemble 8000 psi aircraft type hydraulic system. Conduct endurance testing of system and seals.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (3021), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0023, AIRFOIL APPLICATIONS IN LOW SPEED FLIGHT
C.R. GALLAWAY, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433 (DF135740)

Recent studies conducted by a joint AFFDL/ASD task force have indicated significant performance improvement can be accomplished on future USAF high-altitude long-endurance (HALE) air vehicles with the application of advanced technology airfoils. The technical objective of this work unit is to investigate the use of advanced airfoils in the wings of both low subsonic, 0.2 Mach number and high subsonic, 0.65 Mach number HALE aircraft for performance improvement purposes.

The preliminary design of two generic high altitude long endurance aircraft will be accomplished using state-of-the-art airfoil technology, one for a low subsonic speed mission and another for a high subsonic speed mission. Geometric details of the designs will be limited to those sufficient to compute drag and make a preliminary weight estimate. Advanced airfoils developed and tested as a part of this overall program will be applied to the wings of each aircraft design and mission performance computed. Performance improvement increments to be gleaned from the use of modern airfoil technology will be documented and recommendations made for further airfoil analytical and experimental work.

Supporting agency address information: AF Flight Dynamics Laboratory FXMC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0024, AUTOMATIC GENERATION OF NATURAL CURVILINEAR COORDINATE SYSTEMS FOR AERODYNAMIC PREDICTIONS OF ARBITRARY BODIES
J.K. HODGE, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433 (DF135320)

New military and civilian flight applications require sophisticated methods of aerodynamic analysis and design to minimize costly design errors and to more effectively utilize wind tunnel and flight tests. The objective is to extend present programs and demonstrate the feasibility of new revolutionary approaches to inviscid and viscous aerodynamic predictions for the subsonic and transonic flight regimes. Arbitrary aerodynamic configurations designed and used in military flight vehicles can be timely analyzed.

General curvilinear coordinate systems will be generated automatically for arbitrary multi-element bodies. The coordinate system is solved separately or simultaneously with appropriate equations of motion by methods which are applicable to three dimensions. Viscous incompressible solutions will be extended initially to demonstrate the technology to predict forces on present high lift devices at practical speeds. In the next step the approach will be applied to the transonic flight regime where the curvilinear coordinate system must be dependent upon the flow.

Supporting agency address information: AF Flight Dynamics Laboratory FXM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0025, DEVELOPMENT OF NUMERICAL TECHNIQUES FOR PREDICTING AERODYNAMIC HEATING OF FLIGHT VEHICLES

A.B. LEWIS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433 (DF135950)

At speeds above Mach 3.5 aerodynamic heating is a design constraint for both aircraft and missiles. Definition of the heating environment is necessary for the design of thermal protection systems and the vehicle structure. Hence, poor definition of the thermal environment will result in improper selection of material and structure which can increase acquisition cost and degrade vehicle performance. This effort has as its objective the development of an analysis technique to predict the aerodynamic heating to vehicles of arbitrary geometry. This will improve the ability to determine the heating levels and to perform trades which can reduce acquisition cost.

A critical, in-depth, analysis of the Gentry 3-D body program will be undertaken to bring the heat transfer option to an operational state. Comparison with experimental data and with the Dejarnt heat transfer program will be made. The input data will be made compatible with the two programs. An overall evaluation of the programs will be made through comparisons with experimental data.

Supporting agency address information: AF Flight Dynamics Laboratory FXGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0026, ADVANCED TECHNOLOGY, LARGE AIRCRAFT SYSTEM - PHASE I

R.D. MURPHY, U.S. Air Force. Flight Dynamics Lab., *Dayton, Ohio* 45433 (DF136010)

There will be a definite need within the next 20 years to augment our strategic logistics fleet as well as update our aerial tanker capability. In view of the preceding, this effort will serve to establish basic mission application(s) for these advanced aircraft and define the advanced technologies which enhance the total mission capability. The objective of the effort is to conduct design tradeoffs and sensitivities and to assess the relevant advanced technologies of very large military aircraft. The ultimate result of the program will be to define missions and advanced technologies for large aircraft such that contracted efforts for the Atlas program will be highly focused design efforts. This will enable a more complete assessment of vehicle and overall system effectiveness.

Baseline designs and appropriate parametric variations will be developed for several potential mission applications for the large aircraft. Advanced technologies will be identified by the technology divisions and incorporated into the designs. A design synthesis program will incorporate the above and serve to identify the high leverage technologies and critical mission areas for further investigations.

Supporting agency address information: AF Flight Dynamics Laboratory PTB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0027, COMPOSITE MANEUVER AUGMENTATION (COMMA) FOR FIGHTER AIRCRAFT-ENGINE MODIFICATION

C. BIRD, Teledyne Industries Inc., *Toledo, Ohio* 43697 (DF132320; F33657-74-C-0464)

The next generation of advanced fighter aircraft must have increased maneuverability in the critical combat arena of transonic flight. Recent exploratory research and development has indicated that internally blown jet flaps can augment transonic maneuverability and that advanced composite technology is mature and can provide synergistic benefits to fighter aircraft. The evaluation of these concepts, integrated into a working environment, is a vital step in the evolution of advanced systems. The objective of this contracted effort is the modification and developmental testing of the YJ69T-406 turbojet engine necessary to support the COMMA flight test program.

The conventional YJ69T-406 turbojet engine will be used in a modified BQM-34F supersonic firebee to support the COMMA flight test program. Modifications to that engine will be performed to accommodate the high compressor air bleed ratio required for the jet flaps. These modifications include primarily a manifold to collect and duct the compressor bleed air and adjustment of the turbine inlet nozzle to accommodate the reduced air flow. These modifications and verification tests will be a contracted effort by the J69 engine manufacturer.

Supporting agency address information: AF Flight Dynamics Laboratory PTC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0028, FLIGHT LOADS ANALYSIS FOR THE TH-1L HELICOPTER

A. SPIEGEL, Analytics Incorporation, *Jenkintown, Pennsylvania* 19046 (DN581061; N62269-74-C-0583)

To analyze flight loads data collected from a survey of TH-1L training helicopters for use in the updating of AR-56 helicopter specifications, and to perform comparison of magnetic tape and oscillograph recordings. This contract supports work unit DJ502, Agency Accession No. DN833175.

Data which is semi-reduced at NavAirDevCen will be further reduced. The necessary computer programs for data screening, final analysis, and report generating will be developed.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30312), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0029, ADVANCED TECHNOLOGY AIRSHIPS - FEASIBILITY FOR NAVAL APPLICATION

C.J. MAZZA, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN581059)

To investigate the possible Navy missions which might be conducted utilizing lighter-than-air (LTA) vehicles. Based upon possible Navy missions, a set of 'MILSPEC'-type design criteria will be generated to serve as a basis for LTA vehicle designs. A set of parametric vehicle designs will be developed based upon the postulated missions and the established 'specifications.' Finally, system costs will be estimated.

This investigation will be conducted jointly by the Air Vehicle Technology Department (AVTD) and the Systems Analysis and Engineering Department (SAED). SAED will postulate and investigate the Navy missions and the cost associated with LTA application to these missions. AVTD will develop the design criteria and the parametric vehicle designs.

Supporting agency address information: Naval Air Systems Command (03P3), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

1.0030, ROTOR BLADE FLAPPING CRITERIA INVESTIGATION (HELICOPTER)

J. DAVIS, Bell Helicopter Company, *Fort Worth, Texas* 76101 (DA0D3994; DAAJ02-75-C-0030)

A parametric investigation is to be conducted to identify the pilot descriptive and rotor configuration parameters, and flight conditions critical to rotor flapping, and to attempt to develop design criteria which would allow sufficient rotor motion and structural integrity to prevent loss of the helicopter. This criteria will provide for definition of a safe operational envelope for existing helicopters and will prevent undue operational restrictions of failure of helicopter design in accordance with these criteria.

Flight test experience will be used to establish preliminary rotor flapping criteria. Simplified theories will then be used to investigate the transient and steady-state effect of the individual flight and rotor system parameters on rotor flapping motion. Individual parameters shall then be superimposed on each other to synthesize flight conditions which may be expected to be most critical in terms of rotor flapping. The bell hybrid computer version of the C-81 program, with man-in-the-loop will then be used

to verify how critical these synthesized flight conditions are and to investigate other known critical conditions. The results of this investigation shall then be used as a basis for a substantiated preliminary rotor flapping criteria.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

1.0031, ADVANCED INLET/AIRFRAME INTEGRATION CONCEPTS
J.A. CAWTHON, General Dynamics Corporation, *Fort Worth, Texas* 76101 (DF133990; F33615-75-C-3044)

Advanced aerodynamic lift and thrust vectoring systems are being considered which may enable tactical aircraft to reach extreme angles of attack/yaw in the subsonic/transonic flight regime, thus making the requirements for inlet-engine compatibility more severe than in current systems. Design criteria is needed on integration of the inlet system with forward canards to reduce development and acquisition costs for future tactical aircraft. It is the objective of this program to define advanced inlet concepts for this environment which will prevent or attenuate flow distortion at extreme maneuvers, and employ concepts which are low-cost, light-weight and with improved reliability.

The approach will be to derive advanced geometry concepts, flow modulation devices, and advanced airframe integration techniques. Following a comparative design analysis, preliminary experimental validation will be conducted for proof of concept data.

Supporting agency address information: AF Flight Dynamics Laboratory FXMB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0032, HT AM 75-25- IMPROVED MANEUVERABILITY/AGILITY THROUGH ENERGY CONSIDERATIONS OF SCOUT-TYPE HELICOPTER
D.J. MERKLEY, U.S. Army, Air Mobility Res. & Dev. Lab., *Newport News, Virginia* 23604 (DA0D3967)

To establish Scout-type helicopter maneuvering and agility capabilities using an unmodified OH-58. To perform an analytical investigation to determine the improved maneuvering/agility capabilities of the OH-58 by increasing engine horsepower and rotor inertia.

Establish baseline capabilities by reviewing published data and using the maneuver criteria evaluation program (MCEP) on an unmodified OH-58. Define a standard maneuver scenario for which the unmodified and improved OH-58 will be analyzed for comparison purposes. Analytically vary the engine horsepower and investigate its effects on performing the standard maneuver scenario. Modify MCEP to include the effect of varying rotor inertia. Analyze an improved OH-58 for various rotor inertias simulating the high energy rotor (HER) concept. Investigate the effects of HER on performing the standard maneuver scenario.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, SOS FILM STUDIES
UNKNOWN, Rockwell International Corp., *Anaheim, California* 92803 (DF245460; F19628-75-C-0108)

AF function - radiation hardness of Air Force space and missile systems. Deficiency or opportunity - current nuclear hardness requirements for semiconductor devices are not being met. Objective - to investigate the defects and impurities in silicon on sapphire material which reduces the radiation hardness. How research contributes - the research will contribute to the understanding of the types and concentrations of defects and impurities in silicon on sapphire and how they relate to the radiation hardness of SOS devices. The results of this research will contribute to the development of a radiation hardened technology for use in Air Force space and missile systems.

This program will investigate the sapphire substrate and silicon film to determine defect and impurity concentrations and distributions and will characterize the effects of such imperfections on electrical and radiation hardness parameters of devices fabricated in this material. Techniques for defect studies such as X-ray diffraction, minority carrier lifetime measurements, ion backscattering, and other appropriate techniques will be investigated. Samples of silicon on sapphire material will be studied using these techniques to identify types of defects and impurities and their concentrations. Devices, such as MOS capacitors will be fabricated on these samples and the radiation hardness will be correlated with the defect and impurity studies.

Supporting agency address information: AF Cambridge Research Laboratories LQ, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0002, FAIL-SAFE COMPOSITE ROTOR HUB CONCEPT
R. MAYERJAK, Kaman Corporation, *Bloomfield, Connecticut* 06002 (DA0D3976; DAAJ02-75-C-0013)

Fiber-reinforced composited materials have demonstrated their applicability in high-performance aircraft structures such as helicopter rotor blades, wings, rudders and sections of fuselage. The feasibility of fabricating a helicopter main rotor hub using composite materials has been demonstrated under contract with Whittaker Corporation, Research and Development Division. The objective of this program is to develop improved low-cost fail-safe rotor hub technology. The use of composite materials can both reduce initial cost and provide a fail-safe structure at no increase in weight.

Evaluate new hub concepts for low-cost, low-weight, ballistic resistance, radar reflectivity, and reliability and maintainability aspects. The better concept will be selected for further development which will include material and subcomponent fabrication and testing. After analysis of the test results, the hub design will be updated.

Supporting agency address information: AVSCOM Air Mobility Research and Development Lab, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

3.0003, MEAN FIELD VARIATIONS IN RANDOM MEDIA 12334-E
J.J. MCCOY, Catholic University of America, School of Engineering, *Washington, District of Columbia* 20017 (DA0D5570; DAHC04-75-G-0069)

Development of a statistical theory of linear elastic solids that possess disordered substructures to determine effects of inclusion shape and positioning on the effective mechanical properties of composites. Relevance - composites for diverse Army applications such as helicopter blades, airframe components, body armor, etc., have yet to be designed optimally. This study will provide information which will greatly assist in such evaluations.

Shape and packing information is assumed, and using a computer simulation of the substructure geometry, statistical moments are calculated and interpreted.

Supporting agency address information: AMC Army Research Office, Box CM, Duke Station, Durham, NC 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0004, COLORS AND MARKINGS OF U. S. NAVAL AIRCRAFT 1910 TO DATE
M.J. ELLIOTT, Smithsonian Institution, *Washington, District of Columbia* 20560

This project covers the basic color schemes used on U.S. naval aircraft since its inception and also includes all technical, tactical, honorary and identification markings used on fixed rotary wing and lighter-than-air aircraft. The changes in color descriptions through the years is being pursued in order to relate

the colors of pigmented dopes, lacquers and enamels used in the past to the current Federal color specifications.

When completed the data gathered will provide the technical basis for the correct restoration of naval aircraft external appearance as well as future historical works.

SUPPORTED BY Smithsonian Institution

3.0005, CHARACTERIZATION OF THE RESPONSE OF MATERIALS TO RAPID THERMAL AND MECHANICAL SHOCK LOADINGS

L.R. HETTCHE, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390 (DN580004)

The objective of this program is to characterize the behavior of naval structural materials under rapid thermal and mechanical shock loadings. This requires a thorough knowledge of the variation in mechanical properties of these materials during and following transient or long-term thermal excursions; the mechanical shock response of materials to high intensity radiation; and microstructural modifications induced by such environments which lead to the observed behavior. The knowledge and data generated in this program are relevant to several important Navy material problems, such as exposure to intense electromagnetic radiation, and the aerodynamic heating of ballistic and maneuverable reentry vehicles.

Electron beam and laser radiation are used to generate rapid thermal and shock loadings of materials. Rapid heating rate, high-temperature testing facilities are employed to explore the behavior materials at elevated temperatures. Thermal, mechanical and microstructural properties of structural alloys and composites are studied.

Supporting agency address information: Naval Research Laboratory (6000), Washington, D.C. 20375

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0006, DEVELOPMENT OF ORGANIC MATRIX COMPOSITE AIRCRAFT ENGINE COMPONENTS

UNKNOWN, United Aircraft Corporation, *West Palm Beach, Florida* 33402 (DN590027; N00019-75-C-0138)

To provide lower cost, lighter weight external components for military aircraft gas turbine engines using organic matrix composite materials.

Investigate composite molding techniques such as compression molding, lay-up, and winding. Investigate composite materials such as graphite reinforced polyimides. Design, fabricate and test prototype parts in the laboratory.

Supporting agency address information: Naval Air Systems Command, Washington, D. C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0007, COMBUSTION DYNAMICS OF EXTERNAL BURNING PHENOMENA

W.C. STRAHLE, Georgia Inst. of Technology, School of Engineering, *Atlanta, Georgia* 30332 (DF040500; AF-AFOSR-2794-75)

Many practical Air Force weaponry missions require either a sustained or mile acceleration phase or could benefit from a substantial drag reduction during a portion of the missile/vehicle trajectory. Recent concepts of airbreathing external burning appear attractive for those purposes, however, fundamental understanding of concept is still not at hand. This program responds to research requirements associated with external burning addressed in RO 6.2 and encompasses theoretical and experimental studies directed at elucidating the effect of combustion dynamics upon airbreathing propulsion method of external burning. The objective is to determine the effects of several combustion related processes on base pressure behind axisymmetric bodies at a free stream Mach number of 3.0. Investigated will be (a) the effect of pressure waves generated by a simulated combustion field external to the near wake upon the base pressure, (b) the effects of cold gas injection, peripheral to the base in discrete jets, upon the base pressure, (c) the effects of base bleed, and (d) the effects of an entropy layer adjacent to the near wake created by axisymmetric and discrete probes near the base of the body. In all cases experimental arrangements will be designed and guided by an analytical model of external burning. The experimental results will be used to modify the theory so that it becomes a useful analytical tool for external burning for airbreathing propulsion.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0008, DYNAMICS OF COMPOSITE MATERIALS 12489-E

S. NEMATNASSER, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (DA0D5577; DAHC04-75-G-0059)

To determine the dispersion curve for various modes of harmonic waves in three-dimensional fiber-reinforced composites, and also the mode functions and natural frequencies of elastic composite plates with variable thickness and with reinforcements and/or inclusions. Relevance - specific items of relevance to the Army as mentioned by the reviewers are application to anti-ballistic missile heat shield and structural materials, missile structures, ABM and conventional applications such as aircraft, small anti-tank weapons, as well as in the calculations of vibration frequencies and critical velocities in gun tubes.

Two general variational methods are used. In the first, displacement, strain, and stress fields are varied. In the second, only the stress and displacement fields are given independent variation.

Supporting agency address information: AMC Research Office, Box CM, Duke Station, Durham, NC 27706

SUPPORTED BY U.S. Dept. of Defense - Army

3.0009, SIMULATION OF RADIATION EFFECTS

L.F. LOWE, U.S. Air Force, Cambridge Research Labs., *Bedford, Massachusetts* (DF245340)

AF function - strategic warfare, surveillance. Deficiency - electronic systems in missiles and satellites are not sufficiently hardened to the radiation levels expected to be encountered in space and nuclear environments. Objective - to determine the effects of angle of incidence on dose perturbation phenomena at the interface of high and low atomic numbered materials. Included are radiation effects studies to accurately determine the radiation environment during experiments involving the radiation sources. How research contributes - will provide data for accurate correlation of the effects produced and the intensity of the radiation environment.

Thermoluminescent dosimeters will be used to study the angular dependence of dose enhancement effects using gold-aluminum and beryllium-aluminum slabs. The data obtained will be compared with computer models. The validity of the models which predict maximum effects for perpendicular beams will be tested.

Supporting agency address information: AF Cambridge Research Laboratories LQ, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0010, NAVY VEHICLE DESIGN AND CONSTRUCTION - RESPONSE OF THERMAL/MECHANICAL LOADED STRUCTURES

N.P. HOBBS, Kaman Corporation, *Burlington, Massachusetts* 08103 (DN575186; N00014-75-C-0121)

The objective of the proposed work is to research, develop and utilize analysis techniques for prediction of structural response and damage resulting from high intensity thermal and time-dependent mechanical loading environments. Factors to be considered included thermal radiative, convective, conductive and melting effects as well as temperature-dependent degradation of thermal and structural properties such as yield stress, modulus of elasticity, ultimate strength, specific heat, etc. Composite and honeycomb material construction is to be included.

A heat transfer and thermal stress analysis capability and corresponding computer code called trap has been developed by Kaman Avidyne for response of aircraft exposed to a nuclear

thermal radiation pulse. The trap code will be modified to include laser thermal and mechanical loadings. This necessitates the introduction of third dimensional capabilities. In addition an evaluation of the effects and damage resulting from a heat to failure of simplified and full-scale structure will be conducted and used to validate the revised code.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0011, SILICON NITRIDE LASER DAMAGE RESISTANT RADOME MATERIALS
D.R. MESSIER, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172 (DA0F4750)

The objective of this work is to develop materials to employ in fabricating laser beam deterioration resistant radomes for missiles.

Work at AMMRC has already demonstrated the desirable dielectric properties of silicon nitride for radome applications. Its combination of properties including fabricability, high hardness, high-strength, refractoriness, and outstanding thermal shock resistance make it a leading candidate for such applications. The laser damage resistance of silicon nitride formed by reaction sintering and by hot pressing will be evaluated and compared to that of other ceramic materials. These data will be used as a guide to subsequent development work. If silicon nitride performs as expected, additions such as carbon fibers will be considered to further improve ablative and thermal shock properties without deteriorating dielectric properties. Emphasis will be placed on the particle erosion characteristics of these materials, a property unique to Army requirements. Other tests will assess thermal, mechanical and dielectric properties. The test results will provide feedback for optimization of the material with respect to ease of fabrication and low cost.

Supporting agency address information: AMC Materials & Mechanics Research Ctr, Attn-AMXMR-EO, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0012, NOVEL ARMOR SYSTEMS FOR HELICOPTER SEATS
D.J. PAPETTI, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172 (DA0F4705)

To investigate novel armor systems using electroslag remelted (ESR) steel as the principal impact surface. The armor protection will be directed to aircrew safety with particular emphasis on armored helicopter seats.

The approach will include investigating various systems all of which will include ESR steel as the impact material in a monolithic configuration and as the front face of a composite system. The ESR steel will be hardened to high hardness levels and evaluated at various thicknesses and in composite form with various back face materials including aluminum, woven uoving, kevlar, etc. The armor systems will be ballistically evaluated against various projectiles including cal .30ap and cal .50ap.

Supporting agency address information: AMC Materials & Mechanics Research Ctr, Attn-AMXMR-ER, Watertown, Mass. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0013, EVALUATION AND COMPILATION OF THE THERMODYNAMIC PROPERTIES OF HIGH-TEMPERATURE CHEMICAL SPECIES
M.W. CHASE, Dow Chemical Company, *Midland, Michigan* 48640 (DF040780; F44620-75-C-0048)

Weapon delivery systems and reentry vehicles require more temperature-resistant materials than presently available. New high- energy chemical laser systems are also actively being sought by the Air Force. In every phase of research, design and construction on such systems, there must be an up-to-date, evaluated, self-consistent compilation of fundamental data available. This work is the source of tables of such data for thermodynamic properties of most chemical species of possible interest to aerospace-defense technologies. The information is collected through an exhaustive search of the literature for all thermodynamic data pertaining to a particular species. The evaluation of the data is obtained by considering all techniques for obtaining thermodynamic data including matrix isolation, mass spectromerty, quadrupole electric deflection, IR, UV, Raman and microwave spectroscopy, electron defraction, cryogenic heat capacities, heats of combustion and reaction, vapor pressure measurements, equilibrium and kinetic studies and others. The data are subjected to analysis by complex computer programs to give the best results and correlated with any existing tables to insure self-consistency. The information is reported over a temperature range of 0-6000K. The published tables then provide the most accurate and completd set of thermodynamic data available.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0014, FLUORINATED SYNTHETIC HYDRAULIC FLUIDS FOR SUPERIOR FIRE RESISTANCE
L. STALLINGS, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN581137)

To provide a new class of synthetic fluids with superior fire resistance properties for application to military aircraft hydraulic systems.

Selected aircraft fluids will be chemically modified to incorporate fluorine/perfluoro-ether functional groups into the existing polymer chain. For example, a synthetic hydrocarbon oligomer which is less flammable than a corresponding petroleum fluid will be altered to accept organo-fluorine derivatives. By selective addition of the fluorine containing functional groups performance properties such as flammability could be substantially improved. In addition other fluids such as silicate esters and alkylated silicones which are relatively flammable fluids will also be investigated.

Supporting agency address information: Naval Air Development Center, Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, VARIABLE GEOMETRY TORQUE CONVERTER
R.A. COLLINS, Garrett Corporation, *Phoenix, Arizona* 85034 (DF456530; F33615-73-C-2076)

The objectives of this program is to evaluate the feasibility of varying the horsepower absorption capacity of a torque converter by means of a jet flap in the stator, thus more closely matching the varying output of an APU depending on altitude and ambient temperature.

1. Preliminary design to select optimum variable geometry configuration. 2. Run water table tests to define variable geometry effects. 3. Modify existing torque converter to accept variable geometry. 4. Run tests for a hydraulically variable reactor in an existing torque converter. 5. Select controls approach to match the APU's output with the torque converter. The controls effort will primarily be analytical.

Supporting agency address information: AF Aero-Propulsion Laboratory POP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0002, SELF-INITIATED ANTIAIRCRAFT MUNITION
J. JOHNSON, Philco Ford Corporation, *Newport Beach, California* 92663 (DF635800; F08635-75-C-0068)

The goal of this ARPA-sponsored effort is to demonstrate the feasiblity of airfield interdiction and submarine defense via a self-initiating antiaircraft munition (SIAM) capable of being (1) aerially implanted near airfield runways, (2) released from submarines. The implanted/released munition will automatically detect and launch its missile at suitable aircraft targets.

The prior Phase 0 program established the theoretical feasibility of SIAM. The current Phase I (31 Jan 75-31 Jul 76) will include the fabrication and testing of 'brassboard' critical components (aircraft detection, acquisition, and homing sensors) to demonstrate their feasibility. During Phase II- (1) a preprototype missile housing the acquisition/homing sensor will be tested (2) the preprototype missile will be interfaced with the aircraft detection sensor (3) implant and flotation vehicle work will begin. During Phase III, each SIAM subsystem will be developed and demonstrated. Phase IV includes the integration of all subsystems into a prototype SIAM and testing to demonstrate feasibility and performance.

Supporting agency address information: AF Armament Laboratory DLJM, Eglin AFB, Fla. 32542

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0003, PERFORMANCE LIMITATIONS IMPOSED ON AXIAL COMPRESSOR PERFORMANCE BY STRONGLY NON-UNIFORM INLET FLOWS

F.E. MARBLE, Calif. Inst. of Technology, School of Engineering, *Pasadena, California* 91109 (DF040890; AF-AFOSR-2819-75)

The performance limitations imposed on axial compressor performance by strongly non-uniform inlet flows presents a critical problem to operational aircraft. The versatility of the integral method makes its application to the plane turbomachine problem both attractive and promising. In this effort, the integral technique will be employed in the two-dimensional problem using appropriate cascade characteristics, compressible gas with entropy rise due to losses, and sufficient detail in prescription of profiles. The method will be used to predict and calculate back flow in the stalled or distorted blade flow region. It will also be used to examine flows that can be transformed into steady flows, such as propagating stall. The application of integral techniques to finite amplitude stall onset will be examined. The required detail for extension of this technique to three-dimensional flow fields will be delineated.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0004, DEVELOPMENT OF BORON/ALUMINUM LANDING GEAR COMPONENTS

F. DOYAL, General Dynamics Corporation, *San Diego, California* 92112 (DN581070; N62269-74-C-0619)

To evaluate the application of boron/aluminum composites to landing gear components of Navy aircraft with emphasis on component reliability. This work is in support of work unit HJ202, 'Development of Composite Structure for Naval Aircraft,' Agency Accession No. DN133038.

The component selected for development is the A-7 nose gear drag brace. The conventional brace is representative of the typical steel 'I' section components found in landing gear. This will be replaced with a tubular brace fabricated of boron/aluminum (B/Al) with titanium end fittings. The effects of damage and corrosion on the static and fatigue life of these braces will be evaluated. In total, 15 braces will be fabricated and subjected to various combinations of environments, including static and fatigue loading, foreign particle impact, and corrosion.

Supporting agency address information: Naval Air Development Center (30331), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0005, EXTERNAL FUEL TANKS FOR NAVAL AIRCRAFT AND ASSOCIATED COMPONENTS DEVELOPMENT

D. LITTLEHALE, Royal Industries Incorporated, *Santa Ana, California* 92705 (DN581331; N62269-75-C-0113)

To fabricate survivable external fuel tank. This contract supports work unit DK604, Agency Accession No. 833211.

Use of technology developed under Contract N62267-72-C-0118.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (3053), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0006, ACTIVATE 1.06 MICROMETER DH PHOTOCATHODES

J.S. HARRIS, Rockwell International Corp., *Thousand Oaks, California* 91320 (DF100120; F33615-75-C-1037)

To activate a double heterojunction photocathode with 20 percent quantum efficiency at 1.06 micrometer. The problem is that the S-1 photocathode has only 0.04 percent quantum efficiency at 1.06 micrometers. The quanternary InGaAsP photocathode has two percent quantum efficiency but its response degrades 80 percent within 1000 hours in a fast rise time PMT. The double heterojunction photocathode is expected to have typical operating life time characteristic of GaAs photocathodes. Airborne line scan and space communication neodymium laser systems required a photocathode quantum efficiency of 2 percent at 1.06 micrometer wavelength. The activated double heterojunction photocathode is a candidate for 1.06 microns laser communications, space acquisition and tracking receivers, laser line scan receivers, and eventually as a large area uniform imaging photocathode in laser illuminator and target designator systems.

The quantum efficiency of the activated double heterojunction photocathode will be optimized. The electron transport efficiency will be increased in the double heterojunction floating base transistor by evaluating the effect of liquid phase epitaxial growth parameters, doping levels, and layer thickness in the III-V alloy materials upon minority carrier transport. The double heterojunction floating base transistor configuration makes it possible to transport minority carrier electrons from a narrow bandgap optical absorber to wide bandgap GaAs for emission into vacuum. The photocathode activation study will proceed in three steps. First a P-N-P GaAs floating base transistor will be cesium oxide activated to test junction passivation, contact isolation, and device mounting. Next, a GaAs/GaAlAs/ GaAs double heterojunction will be activated and tested as in step one. Finally, the 1.06 micrometer GaAsSb/GaAlAsSb/GaAs double heterojunction photocathode will be activated and tested for spectral response.

Supporting agency address information: AF Avionics Laboratory TEO, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0007, FLIGHT EVALUATION OF CAE COMPUTERIZED COMPENSATOR & DATA COLLECTION

D. MCHATTIE, Canadian Commercial Corp., *Ottawa, Ontario, Canada* (DN581307; N62269-74-C-0800)

It is necessary to evaluate this system to determine its suitability for fleet use and to obtain sufficient information to develop a comprehensive specification for a compensator procurement. The following areas will be investigated: (a) achievable quality of compensation; (b) compensation time; (c) aircraft parameter dependence; (d) system independence of earthy-field dip angle variation; (e) dependence upon weapon stores configuration; and (f) noise susceptibility. Additionally, total field magnetic signals with a low maneuver noise content will be collected for the first time aboard a fixed wing aircraft. The contract supports work unit DX301, Agency Accession No. DN733073.

(Jun 74 - Sep 74) contract has been let and a test plan has been submitted to the NAD community for comment.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (2022), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0008, DOPPLER RADAR DEVELOPMENT

R.G. STRAUCH, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8C370160)

Project objective: Design, assemble, and test Doppler radar systems for use in meteorological studies. Develop methods of processing Doppler data in a form useful for meteorological analysis. The long-term goal is to develop a real-time display of 3-dimensional velocity fields.

Current year plan: Conduct experiments using multiple Doppler radars on boundary layer processes, using chaff targets, convective storms cells, and snow storms. Develop vertical-looking Doppler. Develop dual pulse transmission and Doppler data

processing system. Develop NOVA software for off-line processing and editing of data.

Progress report: Both new generation Doppler radars are now operational. Dual Doppler data were acquired by the new radars during NHRE, 1974 and on the Olympic Penninsula in Washington state.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

4.0009, FM-CW RADAR DEVELOPMENT

R.G. STRAUCH, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8C370A65)

Project objective: To study the atmospheric boundary layer using clear air radar.

Current year plan: The FM-CW radar will be used in field experiments to reveal the nature of stratification within the boundary layer. Improved methods of recording, processing and displaying the data will be developed. Doppler capability will be incorporated into the system.

Progress report: The FM-CW radar was used to successfully record data during NHRE 1974 and at Fraser, CO last winter, to evaluate pollution conditions in upland valleys during winter.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

4.0010, HIGH-VOLTAGE DC SOLID STATE CONTROLLER

E. MILLER, Martin Marietta Corporation, *Denver, Colorado* 80201 (DN581114; N62269-74-C-0589)

To develop a high-voltage DC low-current solid-state controller with built-in test control to interface with the SOSTEL system for load control. This contract supports work unit DK302, Agency Accession No. DN833199.

To redesign and modify existing Martin Marietta designs to perform to the required operating requirements and interface with the SOSTEL system.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (3043), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0011, FEASIBILITY OF UTILIZING SIMULATED HUB FORCED VIBRATIONS IN HELICOPTER RELIABILITY TESTING

F.D. BARTLETT, Kaman Aerospace Corporation, *Bloomfield, Connecticut* 06002 (DA0D3971; DAAJ02-75-C-0004)

Determine feasibility of using ground tests to duplicate in-flight vibratory loads, structural responses, and stresses to provide a relatively low-cost early means of detecting problems and assessing corrective redesigns early in a helicopter systems development phase.

Under prior contracts a structural dynamic test method for determining the equations of motion of a simple structure was developed and experimentally verified. Further demonstration through application of the method to a full-scale helicopter is planned by this directorate. More recently, Kaman Aerospace has extended the theory, devising a method for determining rotor hub loads (forces and moments) directly from measured fuselage accelerations. Presently, there is no generally effective method for measuring hub loads. Results of this first phase will verify the extended theory and establish its engineering practicality, evaluating calibration procedures, data collection, and data handling techniques, effects of measurement error, and the sensitivity to changes such as gross weight.

Supporting agency address information: AVSCOM Eustis Directorate, US Army Air Mobility Research & Development Laboratory, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0012, ADVANCED INSPECTION AIDS FOR ARMY HELICOPTERS

E.J. NAGY, Kaman Aerospace Corporation, *Bloomfield, Connecticut* 06002 (DA0D3995; DAAJ02-75-C-0031)

The wear indicating rod end (wire) is a design solution to the problem associated with measurement of rod end bearing wear. The objective of this effort is to evaluate the feasibility of the wire.

The work shall be performed in three tasks. Task I - preliminary designs will be analyzed and a selection of the candidate best meeting such factors as reliability, maintainability, producibility and human engineering will be made. Task II - the selected design will undergo a detailed design and analysis and laboratory test specimens shall be fabricated. Task III - testing of the wire test specimens shall include sanitary wear, environmental wear, fatigue and ultimate strength tests.

Supporting agency address information: AVSCOM Air Mobility Research and Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0013, COMPARATOR CALIBRATION FOR PHOTOGRAPHIC IMAGE COORDINATE MEASUREMENTS

J.R. CHAVES, U.S. Dept. of Transportation, Federal Highway Administration, *Washington, District of Columbia* 20590 (020394 (HRB NO.))

It is planned to develop, test, and document a computerized procedure for the calibration of comparators in making precise coordinate measurements on aerial and terrestrial photographs. /FHWA/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

4.0014, FLUERICS/FLUIDICS FOR NAVY AIRCRAFT AND MISSILE SYSTEMS

W.J. WESTERMAN, McDonnell Douglas Corporation, *Titusville, Florida* 32780 (DN581113; N62269-74-C-0723)

To develop an environmentally compensated hydrofluidic laminar angular rate sensor (LARS) which will be usable in aircraft and missile control systems. This contract supports work unit PH101, Agency Accession No. DN833162.

The program will include the following tasks: a. Optimize current pneumatic LARS configuration and incorporate improvements recommended as a result of laboratory evaluation performed under Contract No. N00019- 73-C-0265. B. Design and fabricate a hydrofluidic LARS based on optimized pneumatic configuration. C. Investigate the comparative advantages of an axisymmetric hydrofluidic LARS.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30424), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0015, INVESTIGATION OF HUMAN FACTORS IN TELECONFERENCING SYSTEMS

A. CHAPANIS, Johns Hopkins University, School of Arts, *Baltimore, Maryland* 21218 (APR75-18622)

This award will support the first years' effort in a program of coordinated laboratory and field research which will systematically investigate the circumstances and specific situations of which different kinds of teleconferencing facilities may be cost-effective. It is expected that this research will increase our understanding of man/machine interactions and use of telecommunication systems, and will contribute to the development of all appropriate research methods in this area.

Two major tasks will be undertaken during the first year. Task One involves using controlled laboratory experiments to investigate the utility of four different kinds of teleconferencing systems when used for different tasks, by persons of differing abilities, and by different-sized groups of persons. Task Two will develop and improve methodology for precisely and reliably extracting information from video taped records, in order to facilitate the use of such records in analysis.

In addition, detailed planning for an experimental satellite teleconference in an actual field setting, and for an international conference to disseminate research results, will be carried out.

SUPPORTED BY U.S. Natl. Science Foundation

4.0016, THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER FLOWS
W.L. MELNICK, Univ. of Maryland, School of Engineering, *College Park, Maryland* 20740 (DN223795; N00014-75-C-0613)

Though three-dimensional turbulent flows occur over large regions of aircraft and missiles for many flight conditions, such flows are poorly understood. In addition, present predictive methods are based on extremely inadequate experimental information. It is the purpose of this task to provide the necessary detailed measurements in a low-speed, three-dimensional turbulent boundary layer which are required for the formulation of a meaningful turbulent phenomenological model.

The study of turbulent flows for aerodynamic and hydrodynamic predictive purposes is the study of phenomenological turbulence. Crucial to such studies are experimental data to evaluate closure models for the governing equations. The proposed program is experimental, aimed at obtaining detailed measurements of both time mean and fluctuation quantities in a thick, turbulent boundary layer. The experiments will be conducted on the side wall of a low-speed wind tunnel. The three-dimensional flow will be developed by installing a 30 degree swept wing- like model on the wall of the tunnel. Detailed measurements will be made of the relaxing flow field downstream of the model. Measurements will include pressures and flow angularity characteristics; turbulent velocity fluctuations will be made with hot wire probes.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0017, TRANSPORT PROCESSES AT SUPERSONIC BOMBER ALTITUDES
UNKNOWN, Information Design Inc., *Bedford, Massachusetts* (DF243130; F19628-75-C-0146)

AF function - supersonic aircraft operation. Deficiency - atmospheric transport characteristics and emission effects from aircraft operations at the 15-30 km altitude region of the atmosphere are not thoroughly understood. Research - measurements of transport processes by release of appropriate chemicals. How research contributes - knowledge of small-scale turbulence and wind fields will permit an understanding of the effect of exhaust emissions at supersonic cruise altitudes. Abstract - chemical reactions release techniques are applied to determine atmospheric transport processes in the 15-30 km altitude region where supersonic aircraft emission products are deposited. These processes include the scale and intensity of turbulence, effective turbulent diffusion coefficients, and the effect of vertical transport on the distribution of monomer species.

Supporting agency address information: AF Cambridge Research Laboratories LK, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0018, OPTIMAL DECELERATOR INFLATION
A.L. MURPHY, U.S. Army, Natick Laboratories, *Natick, Massachusetts* 01760 (DA0G4201)

Determine the drag area programs which optimize decelerator performance during inflation.

Conduct literature search. Formulate the mathematical model, and apply the techniques of control theory and variational calculus.

Supporting agency address information: TROSCOM Natick Laboratories, Natick, Mass. 01760

SUPPORTED BY U.S. Dept. of Defense - Army

4.0019, SURVEILLANCE - WEATHER DOPPLER LASER
A. JELALIAN, Raytheon Company, *Waltham, Massachusetts* 02154 (DN575047; N00014-75-C-0282)

The objective of this research is to apply optical Doppler techniques to a determination of the frequency spectrum of wind eddy sizes of impending weather situations. These spectra will then be examined for their utility in the naval meteorological forecast and for remote sensing and reporting of wind.

Existing laser equipment will be used to determine size of wind eddies in various conditions including those preceding arrival of cold fronts or gust fronts and storms. Both optical focusing and variation of pulse length of the laser will be used initially to determine eddy sizes and eventually, to extend range and possibly increase resolution, FM modulation of the laser signal will be used also.

Supporting agency address information: Office of Naval Research, Arlington, Va. 22217

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0020, HYDROFLUIDIC SERVOACTUATOR DEVELOPMENT, ARMY AIRCRAFT
R.A. EVANS, Honeywell Incorporated, *Minneapolis, Minnesota* 55413 (DA0D3998; DAAJ02-75-C-0035)

To provide the Army with a simple, reliable, inexpensive advanced hydrofluidic servoactuator for hydrofluidic stabilization and control systems.

As a continuation of previous research, an investigation of a fluidic servoactuator servovalve mechanism with an amplifier cascade in place of the flapper nozzle will be conducted.

Supporting agency address information: AVSCOM Air Mobility Research & Development Laboratory, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0021, ADVANCED OXYGEN REGULATOR CONCEPTS
G.L. MERRILL, Honeywell Incorporated, *Minneapolis, Minnesota* 55413 (DF132380; F33615-75-C-3004)

Current aviator breathing oxygen regulators waste the on-board oxygen supply, thus, limiting military mission duration capability or requiring prohibitively large on-board oxygen supply sources. Lengthy mission duration requirements of new aircraft, such as the B-1 bomber, make oxygen conservation increasingly important. Design concepts employed by current regulators limit potential improvement of oxygen consumption. This effort will provide a departure in design concept that will result in improved performance tolerance, with an initial goal of up to 50 percent savings of oxygen. Added benefits in the area of improved reliability, lower initial cost, and reduced maintenance are anticipated, by employing concepts such as fluidics to eliminate most moving parts.

Feasibility studies will be conducted by the contractor to select the best proposed design concepts for further refinement. One or two best designs will be fabricated as laboratory breadboards and subjected to laboratory testing and evaluation.

Supporting agency address information: AF Flight Dynamics Laboratory FEE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0022, DEVELOPMENT OF A FLUIDIC ANTI-G VALVE
D.R. RASK, Honeywell Incorporated, *Minneapolis, Minnesota* 55413 (DF318510; F41609-75-C-0008)

New generation fighter-attack aircraft have high sustained g performance characteristics--the ability to rapidly develop and maintain high g in level flight. These high levels of g are above those tolerable to man using present-day anti-g suits and valves. It is important therefore to develop and test new concepts in anti-g suits and anti-g valves in order to enhance aircrew capability at high g. The purpose of this effort is to develop a fluidic anti-g valve which will be useful in determining the optimal inflation schedules for protection against high plus gz.

The approach by the contractor will be developed in 2 phases. Phase 1: (a) study the requirements of a fluidic anti-g valve, easily variable inflation scheduling, preinflation, variable inflation rates during same inflation cycle, and capability of metering into different volumes. Design an experimental fluidic anti-g valve capable of meeting the aforementioned requirements. (b) fabricate an experimental fluidic anti-g valve. Determine performance characteristics of the system, i.e., response time, maximum and minimum inflation rates and reproducibility. Conduct inflation scheduling tests using a standard USAF anti-g suit. (c) an experimental fluidic anti-g valve will be delivered to USAF-

SAM at the termination of Phase 1. Phase 2: the contractor will (a) install fluidic anti-g valve system on USAFSAM centrifuge, (b) conduct preliminary tests with Manikin and Phase 1 inflation schedules, compare centrifuge performance tests with Phase 1 results, and perform any necessary design alterations, (c) conduct tests with a broad selection of 'typical' desirable inflation schedules and compare input data with recorded output data (performance evaluation), and (d) provide consultation during inflation schedule evaluation with human subjects.

Supporting agency address information: USAF School of Aerospace Medicine VN, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0023, FLUIDIC THRUST VECTORING FOR EJECTION SEAT STABILIZATION
J.G. RUPERT, Honeywell Incorporated, *Minneapolis, Minnesota* 55413 (DF134190; F33615-75-C-3031)

Aerodynamic loads and/or rocket thrust line-center of gravity misalignment can result in ejection seat instability leading to reduced trajectory height, unacceptable loads on the crew member, and possible recovery parachute entanglement. The objective of this effort is to investigate and design a fluidic thrust vectoring subsystem for ejection seat propulsion rocket systems.

The applicability of utilizing fluidic techniques to deflect the total escape rocket exhaust plume will be examined. Subsonic and supersonic fluid amplifiers to control the rocket plums deflection as well as the utilization of the rocket exhaust gases as the power source for the fluidic thrust vectoring system will be considered. Experimental validation of a two-axis thrust vector control system using conventional cold gas techniques will be performed. Conventional back mounted escape rockets will be the type considered in this program.

Supporting agency address information: AF Flight Dynamics Laboratory FER, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0024, DEVELOPMENT OF FLIGHT LOAD AUTOLOGGER
E. SELEMI, Conrac Corporation, *Caldwell, New Jersey* 07006 (DN581064; N62269-74-C-0676)

Provide advanced strain level recorder to advance the Navy's fatigue monitoring program. This contract supports work unit DJ704, 'Development of Advanced Metal Structure for Naval Aircraft,' Agency Accession No. DN033220.

Develop an instrument which records sequentially the peak strains to which a structure has been exposed. Recording is on a magnetized disc.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30332), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0025, DESIGN AND FABRICATION OF A COMPOSITE F-14 MAIN LANDING GEAR STRUT DOOR
G. LUBIN, Grumman Corporation, *Bethpage, New York* 11714 (DN581069; N62269-74-C-0535)

To design and fabricate structurally reliable and cost effective F- 14 main landing gear strut doors, using fiberglass/ graphite/epoxy material, that will be practical and suitable for full scale production. This work is in support of work unit HJ202, 'Development of Composite Structure for Naval Aircraft,' Agency Accession No. DN133038.

Perform design and analysis to produce a door design that will be lower in cost and weight than existing aluminum doors, at no sacrifice in performance. As a baseline for this design, contractor will use a previously designed composite door that was structurally sound, and lower in weight, but not cost-effective. Final design will reflect all the experience gained in the fabrication and test of the first door. Perform tooling and manufacturing concept studies for production optimization. Manufacture three doors using production bonding tools and standard composite production techniques. (One door will be laboratory static/fatigue tested at NavAirDevCen to qualify the design for flight.) Install one door on a Navy aircraft and flight test for operational suitability and functionality. (Note: cost of the flight test is not included in the cost of the contract.)

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30333), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0026, STUDY OF IMPACT OF OFC TELECOMM POLICY SPECTRUM STANDARDS
R.L. WHITE, U.S. Air Force, Rome Air Development Ctr., *Rome, New York* 13442 (DF736570)

The objectives of this in-house study are to quantify the difference between OTP requirements and DOD MIL-STD-461 (electromagnetic interference characteristics requirements for equipment) and MIL-STD-469 (radar design requirements), to determine measurement problems to comply with OTP requirements, and to work with the ad hoc interdepartmental Radio Advisory Committee Standards group. The results obtained from this study will allow the Air Force to better identify the required R & D needed to comply with OTP policy.

The approach will be to conduct a comparison study of the OTP engineering requirements with those established in MIL-STD-461 and 469. The results of this study will identify those paramenters which can be compared on a one-one basis, and identify those which are specified differently. Spectrum signature data on selected systems will be compared with OTP engineering criteria to provide insight to the magnitude of the over-all problem areas. Measurement problems related to the OTP standards will be identified and possible changes suggested to the Technical Standards Committee.

Supporting agency address information: Rome Air Development Center RBC, Griffiss AFB, NY 13440

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0027, DISPLAY CONCEPT DEVELOPMENT
J.H. BRINDLE, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319100)

This work unit will develop operator-centered display technology for AF real-time reconnaissance and weapon delivery functions applicable to manned and unmanned systems. Display concepts will be formulated and prototype equipment developed to enhance man's visual ability to interface with various state-of-the-art and advanced development reconnaissance weapon delivery and teleoperator subsystems. These concepts include visually-coupled control/display devices (helmet- mounted sight/display), virtual image display techniques, holographic lens projection techniques and display signal processing/enhancement. Consultation will be provided for further design, development, and deployment of systems based on these concepts. This work unit supports advanced display concept work associated with ASD TN-72-46, High- Acceleration Cockpit, SCO RS/3 Low-Altitude Tactical Reconnaissance, TPG CA-RTA, Digital Avionics Man-Machine Interface, AFAL ADP 698D, Advanced Avionics for Navigation and Weapon Delivery, and AGM-65, Maverick Air- To-Ground Missile. Efforts are coordinated with the Naval Air Systems Command, Army Night Vision Laboratory, Air Force Flight Dynamics Laboratory, Air Force Avionics Laboratory, Air Force Armament Laboratory, Aeronautical Systems Division, Air Force Office of Scientific Research, and the Advanced Research Project Agency.

Promising state-of-the-art technology in optics, electrooptics and signal processing components will be applied to develop and evolve operator display subsystems and concepts which enhance overall operator display subsystems and concepts which enhance overall operator performance in target acquisition and weapon delivery tasks. These display concepts will use unique psychovisual and cognitive processing capabilities of the human operator. Solid-state matrix-element image sensing and generating devices will be integrated with new techniques, including holographic diffraction optics, to project images to the operator's visual field. Development of variable resolution and color virtual image displays will be continued. Two-dimensional spatial filtering, color enhancement, pseudo-stereo effects and image multiplexing will be demonstrated and their effects on target acquisi-

tion defined in the display/image metric laboratory. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0028, CALCULATION OF III-V SEMICONDUCTOR PROPERTIES
T.C. COLLINS, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio* (DF214880)

AF function - detection, communication and surveillance. deficiency - low-cost solid-state RF source, MOS devices, memory devices and imaging devices used in Air Force systems. Research - computer simulate the responses of III-V semiconducting compounds to external perturbations using only the crystal symmetry and atomic number of the atoms composing the compound as input data. How research contributes - having the predictive capability to computer simulate semiconductor responses to external perturbations will provide a very large cost savings in electronic device development. Instead of the trial and error procedure which is used now, one will be able to concentrate on one particular material with the correct impurity doping in order to obtain the optimal performance for a desired device.

The approach taken is to solve from first principles the electron, phonon and electron-phonon interaction of the perfect III-V compound crystals plus calculate the density-density and current-current response functions. A first principles calculation requires the correct treatment of exchange plus correlation corrections. It also means calculating from first principles the surface effects as well as the effects resulting from the interfaces between the semiconducting surface and other materials such as an oxide layer or metal.

Supporting agency address information: Aerospace Research Laboratory LS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0029, EVALUATION OF CAST CARCASS TIRES FOR USE ON MILITARY AIRCRAFT
J.R. HAMPTON, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433 (DF135160)

Air Force aircraft tires presently are essentially fabricated by hand which results in high initial purchase costs for these tires. The objective of this work unit is to evaluate state-of-art capability to manufacture cast carcass tires, which have carcasses which are cast/molded in one step, for aircraft application and to establish research and development work needed to provide cast carcass tires for military aircraft. This work will result in the preparation of a cost- and time-effective plan for the development of cast carcass tires. Development of the cast carcass tire will have a significant effect on reducing Air Force tire procurement costs.

First, existing ground vehicle cast tires will be evaluated in the AFFDL landing gear test facility. Based on the test evaluation, cast carcass tires will be designed and fabricated utilizing state-of-art technology. Then, these tires will be tested, evaluated and the results provided to the manufacturer. Next, tire redesign, fabrication and laboratory testing will be accomplished. Finally, based on testing and evaluation, a cost- and time-effective plan for aircraft cast carcass tire development will be prepared.

Supporting agency address information: AF Flight Dynamics Laboratory FEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0030, SUPERSONIC INTERACTIONS
R.H. KORKEGI, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio* (DF215180)

AF function - advanced aerospace vehicles and weapon systems. Deficiency - need for improved laser diffusers. Need for turbulence data for theoretical prediction methods. Research - studies of two- and three-dimensional shock wave-turbulent boundary layer interactions and means of boundary layer control to prevent separation. Studies of supersonic turbulent boundary layer characteristics in region of pressure gradient. How research contributes - knowledge for design of more efficient laser diffusers and for formulation of theoretical models and validation of theoretical predictions.

Experimental studies of turbulent boundary layers on wind tunnel models and wind tunnel side wall, and their interaction with externally generated shock waves, the use of cavities blowing, and suction for boundary layer control. Experiments are primarily carried out in the ARL Mach 3 and Mach 6 high Reynolds number facilities.

Supporting agency address information: Aerospace Research Laboratory LH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0031, EO CROSS SECTION MEASUREMENTS
G. REINHART, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433 (DF101830)

To determine the cross section of strategic and tactical A/C to potential laser threats and to define techniques for cross section reduction. Additionally, the feasibility of using model A/C for cross section determination will be investigated.

The laser cross sections of various A/C will be measured at wavelengths of potential threat. Both static and dynamic measurements will be conducted at various A/C aspect angles and the results compared to determine the validity of static testing. Measurements will also be made on scale model A/C to determine the feasibility of scaling laser cross section and to evaluate methods of cross section reduction.

Supporting agency address information: AF Avionics Laboratory WRP, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0032, IMAGE/DISPLAY METRICATION
H.L. TASK, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319330)

There is a need in the Air Force to develop objective measures of image quality produced by various sensor/display subsystems and relate these measures to operator performance. Laboratory studies will be conducted to investigate the utility of alternative measures of display quality and target image characteristics to predict operator target detection, identification and recognition performance. Techniques will be developed to quantify displayed information in terms of its spatial, energy, spectral and temporal components. Alternative multidiemnsional image quality metrics will be compared to establish their utility and meaningfulness in terms of operator performance. These metrics will also be evaluated for suitability as input to models of information processing and target acquisition performance through either computer automation or human visual means. Results will be applied to the several advanced sensor/display subsystem development efforts by the Army Night Vision Laboratory, Air Force Flight Dynamics Laboratory, Air Force Avionics Laboratory and Electronics Systems Division. These applications are typified in the requirements of PMD R-Q 3-013-3, AFAL ADP 665A and TPG RPW-RTA.

A broad range of electro-optical and infrared imaging sensor/display subsystem characteristics will be simulated in the display/image metric laboratory. Techniques and procedures for quantifying display parameters and image characteristics will be developed and refined, including measures of modulation transfer (sine wave response), luminosity transfer (gray shade response) and signal-to- noise ratio. The adequacy of these techniques will be established in terms of their relative effects on operator performance.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0033, SPATIAL AND TEMPORAL PROPERTIES OF FLUCTUATING PRESSURES ON RE-ENTRY VEHICLES
J.R. HOWE, General Electric Company, *Philadelphia, Pennsylvania* 19101 (DF135100; F33615-75-C-3095)

Re-entry weapons are exposed to intense fluctuating pressures resulting from turbulent boundary layer phenomena. These pressures can excite significant vibrations which adversely affect both the structural integrity of the vehicle and the reliability of internal components. Vibration qualification levels on internal

components must be high enough to assure reliability but not so overly conservative as to impose undue costs on military re-entry weapons. In order to establish realistic vibration levels, methods to define the intensity, spectra, and the spatial and temporal properties of the aero-acoustic loads associated with re-entry weapons are required. The program objectives are to obtain the spectral and temporal properties of these aero- acoustic loads, compare them to other empirical data, and to develop expressions and/or techniques to estimate these properties.

Existing aero-acoustic data from an extensive wind tunnel program on re-entry vehicles will be reduced and analyzed. The cross power spectral densities, broadband cross-correlation functions and narrow band cross-correlation functions will be generated for the array of test conditions available. The final results will be expressions and techniques to estimate these correlation functions.

Supporting agency address information: AF Flight Dynamics Laboratory FYA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0034, LOW-COST INERTIAL SYSTEMS

J. PARMENTIER, Inland Goerz Optical Company, *Pittsburgh, Pennsylvania* 15238 (DN581215; N62269-74-F-6579)

Develop capability to investigate high-rate inertial instruments required for strapdown inertial navigation systems utilized in high- performance naval aircraft. This contract will support work unit DV401, Accession Number DN233080.

Investigate high-rate performance of gyros mounted on the test table. The table must be capable of being controlled manually or by a computer program that will subject the instrument to any particular input rate profile desired for strapdown inertial navigation system operation.

Supporting agency address information: Naval Air Development Center, Naval Navigation Laboratory (607), Warminster, Pa. 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0035, SURVEY OF AIR FORCE AIRCRAFT ENGINE POLLUTION EMISSION FACTORS

UNKNOWN, Scott Environmental Tech. Inc., *Plumsteadville, Pennsylvania* 18949 (DF182600; F29601-75-C-0046)

The accurate measurement of pollution emission factors and calculation of emission indices for carbon monoxide, hydrocarbons, oxides of nitrogen, and particulates from all operating modes of all aircraft engine models of significant Air Force usage. This will alleviate the current severe lack of pollution emission indices for Air Force engines, and facilitate much more accurate assessments of environmental impact and proposed pollution control strategies.

The AFWL mobile emissions laboratory developed under project 19008W06, Acc. Number 177310, will be taken to Air Force engine rework facilities and emissions will be measured during normal engine acceptance testing. Large numbers of engines will be tested to determine true means and engine-to-engine variability within each engine model. Data will be analyzed and emissions indices developed for all engines and conditions tested. Work will be performed by contractor selected by multiple source procurement.

Supporting agency address information: AF Weapons Laboratory DEE, Kirtland AFB, N Mex 87117

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0036, DEVELOPMENT OF TECHNIQUES FOR ACOUSTIC EMISSION SIGNATURE ANALYSIS

W.R. SCOTT, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN581136)

Relationships between naval aircraft structural material failures and acoustic emissions will be defined utilizing phenomenological and mechanistic approaches. Significant acoustic emission parameters will be identified and efficient techniques developed for their measurement. Ultimately it is anticipated that devices will be developed for in-situ acoustic monitoring of critical components of naval aircraft.

Acoustic emission phenomena have been identified with numerous modes of material failure and degradation, e.g., stress corrosion, and composite failure. However, few investigators have exploited fully the information available from acoustic events. In this study emphasis will be placed on the development of general techniques for acquiring data on acoustic events and optimizing correlation of that data with macroscopic events of interest. Automated techniques will be developed for recording frequency spectrum, rate, amplitude/location for acoustic events. By employing computerized optimization techniques,combination of variables most closely associated with parameters of interest can be ascertained providing a logical precedure for determining specifications and features necessary in an acoustic emission device for a specific application.

Supporting agency address information: Naval Air Development Center, Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0037, SERVICE EVALUATION OF S-3A COMPOSITE SPOILERS

O.E. DHONAU, L T V Aerospace Corporation, *Dallas, Texas* 75222 (DN581068; N62269-74-C-0629)

To evaluate the performance of composite structure in Navy operational environments and to obtain manufacturing costs data for composite structure in a pilot production run. This work is in support of work unit HJ202, 'Development of Composite Structure for Naval Aircraft,' Agency Accession No. DN133038.

A lower left graphite S-3 spoiler has been developed and successfully tested as part of a previous contract. The methods developed will be used to fabricate additional pairs of spoilers. After a flight test of the first pair, the spoilers will be installed on operational aircraft and closely monitored. Periodically, the spoilers will be removed, inspected and tested to determine the damage or degradation in structural properties for exposure of up to 5 years.

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (30331), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0038, SOSTEL FIBER OPTIC INTERFACE BREADBOARD

W.T. TURNAGE, L T V Aerospace Corporation, *Dallas, Texas* 75222 (DN581119; N62269-74-C-0361)

To demonstrate the use of fiber optics technology for the transmission of digital information within a multiterminal, bidirectional data system. This contract supports work unit DK301, Agency Accession No. DN033106.

Utilizing the information and designs developed under contract N62269-73-C-0411, interface units will be designed and fabricated to allow the integration of fiber optics data transmission hardware with the SOSTEL II data handling system. The fiber optics hardware (connectors, photo diodes, photo transistors, etc.) have been developed and will be made available by the Naval Avionics Facility, Indianapolis. (NAFI).

Supporting agency address information: Naval Air Development Center, Air Vehicle Technology Dept. (3043), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0039, POWERED LIFT AERODYNAMICS

R.G. BRADLEY, General Dynamics Corporation, *Fort Worth, Texas* 76101 (DF134230; F33615-75-C-3033)

Recent studies of advanced fighter aircraft have indicated that significant transonic maneuver performance gains may be possible through a combination of vectored thrust and wing leading edge vortex augmentation. The objective of this effort is to experimentally investigate this combined blowing approach. The basic idea of this concept is to locate the engine exhaust nozzle over the wing and ahead of the trailing edge. A jet flap effect is achieved by turning the exhaust flow over a coanda trailing edge flap. Vortex augmentation is combined with this effect by vectoring a portion of the engine efflux spanwise.

Tests will be conducted in the NASA/LRC 7 x 10 ft low speed and 16 ft transonic wind tunnels using a contractor-owned model. Lift, drag and pitching moment data will be taken for a range of angle of attack from minus 4 degrees to the maximum obtainable and for Mach numbers ranging from 0.2 to 1.2. Systematic variations in propulsion system geometric and flow parameters will be made to determine the effects on measured aerodynamic forces. The parameters to be investigated will be typical of actual engine operating conditions and will include a nozzle pressure ratio range from choked to, nominally, 8. Jet momentum coefficients ranging from 0 to 0.2 at 0.9 Mach number. The experimental data will be compared to predictions and the prediction methodology will be revised where necessary to improve the correlation.

Supporting agency address information: AF Flight Dynamics Laboratory FXM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0040, VOICE RECOGNITION AND SYNTHESIS SYSTEM (VRASS) FOR NAVAL AIRCRAFT
G. MOSCHETTI, Scope Electronics Incorporated, *Herndon, Virginia* 22070 (DN581158; N62269-73-C-0411)

(A) Develop software subroutines for 704 Raytheon computer system to effect voice recognition and synthesis system (VRASS) interactive voice language. (B) Improve software algorithms for syntactical handling subroutines. This contract supports work unit DW102, Agency Accession 233011.

Develop and debug software subroutines for Raytheon 704 computer to enable read-in of large-size dictionary, syntactical handler for both decoding what operator has said and encoding of string of words for voice synthesis unit.

Supporting agency address information: Naval Air Development Center, Crew Systems Department (402), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0041, VOICE RECOGNITION AND SYNTHESIS SYSTEM (VRASS) FOR NAVAL AIRCRAFT
G. MOSCHETTI, Scope Electronics Incorporated, *Herndon, Virginia* 22070 (DN581159; N62269-74-C-0679)

Develop software subroutines for 704 Raytheon computer system to improve voice recognition for VRASS. This contract supports work unit DW102, Agency Accession 233011.

Task 1. Develop segment encoder logic. Task 2. Derive segment basis sets. Task 3. Develop and test command decision logic. Task 4. Deliver and encoder interfaced at NADC.

Supporting agency address information: Naval Air Development Center, Crew Systems Department (402), Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

4.0042, HT RM 75-24- ELECTRICAL SYSTEM TECHNOLOGY SURVEY
G.A. BIROCCO, U.S. Army, Air Mobility Res. & Dev. Lab., *Newport News, Virginia* 23604 (DA0D3966)

To familiarize personnel of this Directorate with the state-of-the- art in Army helicopter electrical systems, and to provide a basis for formulating a detailed FY76 program plan aimed at advancing electrical system technology relative to reliability, maintainability, performance, weight, cost, safety, survivability, and vulnerability. Specific electrical system areas to be covered include power generation, conversion, storage, distribution and utilization as well as small hardware components such as lights, terminals and connectors.

The objectives of this program will be accomplished via a survey of organizations whose intimate experience with the design, operation and maintenance of helicopter electrical systems qualifies them to participate in this program. At this time, a representative list of participants includes ARADMAC, Bell Helicopter, Boeing Vertol, Hughes Helicopters, Kaman Aerospace, Lockheed, Petroleum Helicopters, and Sikorsky Aircraft.

Supporting agency address information: AVSCOM Air Mobility R and D Lab, Eustis Directorate, Ft. Eustis, Va. 23604

SUPPORTED BY U.S. Dept. of Defense - Army

4.0043, Q-FLEX ACCELEROMETER IMPROVEMENT
W.K. HUESTIS, Sundstrand Data Control Inc., *Redmond, Washington* 98052 (DF102660; F33615-75-C-1281)

The total life cycle cost of inertial systems require cost reduction on current and planned DOD weapon systems. An operational cost reduction of 75 percent (between five and 10 dollars per flying hour) is needed and can be primarily attained through reduced maintenance. Improving inertial system stability and repeatability of performance can give wider operational margin and increase mean time between maintenance. The objective is to improve accelerometer stability and repeatability while maintaining current operating performance and low acquisition cost. This improvement can reduce maintenance ultimately reducing system operational costs. The initial goal is to establish the feasibility of an accelerometer with low thermal sensitivity.

Stability and repeatability of inertial sensors are primarily a function of thermal sensitivity and fabrication technique. The current approach to achieve good stability has been to use active thermal control to maintain a stable thermal environment. This approach results in built-in thermal cycling mechanism which leads to poor repeatability (day to day), frequent recalibrations, and hence, increased maintainability. To meet the objectives of this effort, thermal sensitivity will be reduced such that active thermal control will not be required. This requires operating over the environmental temperature range without heaters and maintain adequate stability and repeatability. The approach involves isolating and identifying thermally sensitive parameters through theoretical and experimental investigation, experimentally determining the impact of these parameters, creating an accelerometer design with low thermal sensitivity, modifying a current accelerometer according to this new design, and test and accelerometer to verify desired improvements.

Supporting agency address information: AF Avionics Laboratory RWN, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, MATERIALS PIT INVENTORY
B. KAY, State Dept. of Transportation, *Phoenix, Arizona* 85007 (100544 (HRB NO.))

An inventory of all known and potential sources of rock and aggregate in Arizona is being made. A geological investigation by means of air-photo analysis of selected areas is supplemented by field investigation to verify data, to make a photogeologic map of each area studied, to evaluate the rock and aggregate listed on the data sheet for each area, and descriptive report by counties, also included are current land status maps and index maps of aerial photograph and USGS topographic map coverage. Pit information is being transferred to punched cards for automated storage and retrieval.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - F.H.A.

5.0002, AERIAL PHOTO SPECIFICATIONS FOR FORESTRY
R.N. COLWELL, Univ. of California, Agricultural Experiment Sta., *Berkeley, California* 94720 (0010844; CA-F0-FRU-1329)

OBJECTIVE: Determine, for forested areas, the type of aerial photography from which information essential in the practice of forestry can be most accurately and readily extracted.

APPROACH: The work will be designed so as to permit a determination of the relative ease and accuracy with which forest composition, vigor, density, size, age structure, and land features can be recognized on photographs taken with various film-filter combinations, at various scales, and at various times of the day and year. Spectrophotometric analyses of the objects and condi-

tions to be identified will first be made, in order to select the film-filter combinations which theoretically will provide the best photographic tone or color contrasts. Aerial photography of representative forest areas will then be flown with the selected film-filter scale combinations at various times of the day and year. Through photo interpretation, estimates will be made from each set of photos as to forest conditions existing within the test areas. The accuracy of the interpretations will be determined by field checking, so that the specifications for optimum forest photography can be formulated.

PROGRESS: During 1973 our forestry test site areas in California were photographed on several dates by the Skylab astronauts from an altitude of 275 miles. On approximately the same dates aerial photos of the same sites were obtained both from conventional altitudes and (through use of a U-2 aircraft) from an altitude of 65,000 feet. By means of a comparative analysis of all of these photos, several photo interpreters sought to inventory the total earth resources 'complex' in selected areas in order to determine the optimum aerial and space photo specifications for use in making multiple resource inventories of forested areas. The highest rating, overall, was given to photography flown with infrared Ektachrome (false-color) film. In order of decreasing usefulness the other film-filter combinations tested were conventional Ektachrome with an appropriate haze-cutting filter, panchromatic film with a Wratten 25 (light red) filter, black-and-white infrared film with a Wratten 89 (dark red) filter and panchromatic film with a Wratten 58 (green) filter. Sharpness was greater on Ektachrome than infrared Ektachrome photos but the reverse was true for color contrasts among most of the important earth resource features.

SUPPORTED BY California State Government - Sacramento

5.0003, OCEAN BUOY ATMOSPHERIC TEMPERATURE
M. DECKER, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8AA72246)

Project objective: Determine error statistics that may be used to establish the operational value of microwave radiometric temperature profile sensing of the atmosphere from ocean data buoys.

Current year plan: Summarize currently available applicable information. Do a computer simulation of temperature retrievals for specific classes of profiles in the marine environment. Estimate by computer simulation the errors introduced by buoy motion and by the presence of clouds.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0004, RAMS
R.N. GRUBB, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8G171253)

Project objective: Design and development, management of procurement and installation of the Data System for the NOAA P3D weather research aircraft.

Current year plan: Installation planning, equipment acceptance testing and system integration and aircraft installation. Computer program development.

Progress report: A contract has been placed for the majority of the data system. Delivery is expected in early November, 1974. Aircraft installation planning is largely complete as far as the aircraft contractor interface is concerned.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0005, CYCLONE AND SEVERE STORM MODIFICATION
H. WEICKMANN, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8G1305XX)

Project Objective: Conduct a research program to investigate the modification potential of extratropical cyclonic storms so as to mitigate their attendant severe weather.

Current Year Plan: (1) Work will continue on the development of a numerical model of a cyclonic system. (2) Diagnostic and analytical studies will be conducted of the life cycle of cyclonic storms, including aircraft surveillance of extratropical storms. (3) Conduct measurements and investigations of nucleation and cloud microphysical processes in support of numerical modelling and analytical studies. (4) Conduct studies of atmospheric electric parameters. Progress is reported in Journals and Publications and summarized in collected. Reprints of APCL 1974 (now in press).

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0006, THUNDERSTORM DETECTION
K.E. WILK, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8C370404)

Design, install, and test a network of surface stations capable of digitally recording and telemetering the wind speed and direction suitable for immediate mesoscale observation of the low level airflow in the environs of severe storms. In addition, provide accurate, compiled data fields of wind velocity, temperatures, pressure, humidity, and rainfall in a form suitable for post mesoscale synoptic analysis of severe storm periods. Operate a tall meteorological tower and radiosonde station and obtain meteorological profiles of wind, temperature, and humidity in the lower and middle troposphere during severe storm periods. Continue the analysis of severe storm events, including hailfalls, heavy rainfall, tornadoes, and strong windgusts and relate these events to the quantitative weather radar data. Develop techniques for the analysis, display, and tracking of severe storm events for the improvement of severe thunderstorm warnings.

Current year plan: Continue the collection and analysis of severe storm events including surface wind gusts, heavy rainfall, and hail. Analyze the radar reflectivity data to determine the motion, predictability and water output characteristics of the severe thunder- storms associated with the events.

Progress report: The development and testing of digital processing and recording equipment for the tower and remote surface sites is continuing. The characteristics of radar and surface network observations collected during severe rainstorms were analyzed and documented for publication. Computer processing techniques were developed for combining quantitative radar and raingage data to produce a more detailed and accurate precipitation map. This technology was transferred to the Office of Hydrology, National Weather Service for operational application.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0007, THERMAL SURVEILLANCE OF VOLCANOES - REMOTE SENSING OF LONG VALLEY IN GEOTHERMAL PROGRAM
J.D. FRIEDMAN, U.S. Dept. of the Interior, Geological Survey, *Denver, Colorado* 80225 (9730-00345)

States to which project pertains: Washington, Oregon, California, Hawaii.

Under the auspices of a comprehensive geothermal remote sensing project, the present project is designed primarily to test and evaluate aerial, and where suitable, satellite infrared scanning techniques and concomitant ground observations in geothermal studies, both as reconnaissance and mapping tools. The goal of this project is (1) to utilize quantitative thermal image data in conjunction with digital computer processing to record time-dependent changes in thermal emission (i.e., temperature, radiance, and near-surface anomalous heat flow) from surface manifestations in geothermal areas, (2) to analyze the planimetric distribution of anomalies in relation to structure and geophysical anomalies and (3) ultimately to determine radiative and other energy loss from the terrestrial surface in geothermal areas. In application of these techniques to volcanic systems the goal is similar, and in addition, we shall estimate minimum thermal energy yields during repose periods of volcanoes, as a base of reference for comparison with future periods of activity and as an aid in understanding the overall energy budget of volcanic systems.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

5.0008, RESEARCH-AIRBORNE
F.C. FRISCHKNECHT, U.S. Dept. of the Interior, Geological Survey, *Denver, Colorado* 80225 (9730-00353)

The objectives of this project are to improve airborne radiowave and induction prospecting and mapping techniques and to apply these methods to a wide variety of geologic problems. New systems for measurement of both electric and magnetic field components of VLF and LF waves from existing transmitters have been and are being developed. Development of an induction system using a ground based transmitter and an airborne receiver for use at audio frequencies has been initiated. This system will offer a much greater depth range of exploration than the radiowave methods; of course, it will not be practical for large scale reconnaissance mapping. Interpretative techniques for radiowave and induction methods which rely heavily on scale and computer modelling and computer processing of field data are being improved.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

5.0009, LIGHT AIRCRAFT PHOTO AND MAPPING RESEARCH

R.L. PARKER, U.S. Dept. of the Interior, Geological Survey, *Denver, Colorado* 80225 (9350-00800)

This project seeks to develop techniques of aerial photography using small format cameras, and of aerial geologic reconnaissance in order to assist geologic mapping and mineral resource investigations. Currently a T-41B is being used to fly 70-mm cameras for both vertical and oblique photography using color and black-and-white films. Projects supported are primarily resource studies in the Rocky Mountain states.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

5.0010, WORLDWIDE SEISMOGRAPHIC COMMUNICATIONS NETWORK

J.C. FUENZALIDA, Comm. Satellite Corporation, *Washington, District of Columbia* 20024 (DF041600; F44620-75-C-0092)

The proposed contract is to design an economically and technically feasible satellite communication network for the purpose of collecting world-wide seismic data. Data obtained at seismic stations conducting research under the long period seismic experiment throughout the world would be returned to the seismic array center in Alexandria, Va., via satellite communication links. The stations are located in Norway, Spain, Israel, Thailand, Australia, Japan, Bolivia, and Korea. The digital seismic data will be made available to scientific community to conduct discrimination research for the ARPA VELA objective.

Supporting agency address information: AF Office of Scientific Research NPG, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0011, GEOMORPHOLOGY, FLORA AND VEGETATION OF PHOENIX ISLANDS

F.R. FOSBERG, Smithsonian Institution, *Washington, District of Columbia* 20560

Reconnaissance study of geomorphology, correlated with vegetation, of six of the eight Phoenix coral islands; detailed semi-descriptive flora based on authors' collections and all available previous collections, and on records and data from literature. Vegetation patterns and land-form data supplemented by study of air photos.

SUPPORTED BY Smithsonian Institution

5.0012, DEVELOPMENT OF SATELLITE IMAGERY - MARINE RESOURCE ANALYSIS TECHNIQUES

A.J. KEMMERER, U.S. Dept. of Commerce, Technology Division, *Washington, District of Columbia* 20235 (SEC-013-77-FE-R-1)

Objectives: a. Establish the persistence of the relationship between menhaden distribution and MSS image density levels determined in a previous investigation. b. Determine the quantitative reflective radiance ranges associated with menhaden school locations and determine the temporal variability of this relationship. c. Develop a technique using spectral pattern recognition to classify water masses with respect to marine resource distribution and determine the temporal persistence of the relationship.

Approach: Acquire and identify positions of menhaden schools in Mississippi Sound using an aerial photographic survey on selected days of ERTS overpasses. Perform precision density slicing and color enhancement of the ERTS digital tape and attempt to relate the distribution of menhaden schools to specific density levels. Apply spectral pattern recognition techniques for analysis of the digital tapes.

Planned activities (1975): Develop and coordinate plans for field operations and data analysis activities.

Commence data acquisition and identification of menhaden schools in the Mississippi Sound.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0013, HF RADAR SPECTRAL ANALYSIS FOR REMOTE SEA SENSING

D.B. TRIZNA, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390 (DN580094)

The aim is to develop techniques for the extraction of oceanographic and meteorological parameters from Doppler power spectra of HF radar energy backscattered from the sea. These techniques will be applied toward remote sensing operations of a over-the-horizon HF radar collecting data from cells contained in ocean areas over millions of square miles. Naval ship counting activities are regular users of such data, which is presently reported by ships at sea, a technique which tends to leave large areas unreported on. Both surface and subsurface naval operations can be severely restricted by lack of data from such areas. Thus, comprehensive real-time knowledge of ocean waves is essential for the intelligent application of naval forces.

Use sea echo radar located on San Clemente Island to gather Doppler spectra at consecutive azimuthal positions covering azimuths from 300 degrees to 340 degrees in 2 degree steps in the surface wave mode. Also gather spectra from two other available azimuths of 250 degrees and 280 degrees to complete full 90-degree coverage. Collect waverider buoy spectra simultaneously for omnidirectional wave spectrum for comparison. Compare data with theoretical models generated. Apply results to data tranferral in tests with Fleet Numerical Weather Central, Montery.

Supporting agency address information: Naval Research Laboratory (5000), Washington, D.C. 20375

SUPPORTED BY U.S. Dept. of Defense - Navy

5.0014, DATA ACQUISITION SYSTEMS DEVELOPMENT

E.G. WOODS, U.S. Dept. of Commerce, Fisheries Engineering Lab., *Miami, Florida* 33149 (SEC-013-77-FE-A-1)

Objectives: a. Establish the feasibility of utilizing satellite imagery of oceanographic parameters to assess, monitor and predict the distribution and availability of living marine resources. b. Develop capabilities of airborne remote detection systems to automatically locate, identify and quantify living marine resources using phenomena such as bioluminescence, spectral signatures and other indicators. c. Evaluate and develop direct biological sampling techniques and systems to provide optimum specimen capture with minimum damage.

Approach: Projects are those which acquire data related to living marine resources or directly acquire biological samples. Primary emphasis is placed on developing, or applying existing systems and techniques to remotely sense biological phenomena using aircraft and satellite platforms.

Vast aerial coverage is economically feasible if aircraft are used instead of surface vessels. The average cost per cruise track mile is approximately eight times greater for surface vessels than for aircraft. This task will focus primarily on the development of remote sensing systems to enable aircraft to synoptically survey vast ocean areas; satellite survey techniques will also be investigated.

Planned activities (1975): Test the feasibility of utilizing laser technology to assess living marine resources. Test the capability of a high resolution sonar system (Shadowgraph) to detect biological targets and non-biological obstructions. Perform aerial surveys over bluefin tuna using a low light level image intensifier system to determine its application as an assessment technique.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0015, NUMERICAL WEATHER PREDICTION OVER THE TROPICS

T.N. KRISHNAMURTI, State University of Fla. Sys., School of Arts & Sciences, *Tallahassee*, *Florida* 32306 (OCD70-00080 A08)

The objective of this research is the preparation of an archival tape of cloud motion vectors for the 100 days of the GARP Atlantic Tropical Experiment (GATE). This archival tape will be made available to the National Data Processing Center (NPC) through the U.S. GATE Project Office of NOAA. This archival tape is made up of a number of different data sources and two different satellites. Because of the varied nature of this data, considerable editing and formating needs to be done to prepare this data for the 100 days of GATE.

SUPPORTED BY U.S. Natl. Science Foundation

5.0016, AN INVESTIGATION OF THE FEASIBILITY TO AUTOMATICALLY DEVELOP A LAND USE MAP OF KANSAS

R.M. HARALICK, Univ. of Kansas, Center For Res. Incorporated, *Lawrence*, *Kansas* 66044 (082205 (HRB NO.))

The aim of the study is to produce a statewide land use map through automatic processing of Earth Resources Technology Satellite (ERTS) digital image data. Three strips covering a 30 x 120 mile area were mapped, each located in geographically different areas of the state. The products of the study are 1:250,000 coded land use maps of each strip; a statistical distribution of land use categories within the strip, and a comparision of the accuracy and cost of automatic processing with the results of human interpretation. The image processing laboratory of the University's Remote Sensing Laboratory has several on-going projects with NASA using ERTS digital data. This data, and methods of automatically processing it, has been successfully tested on prior projects. Ground truth data for the test strips has been accumulated by interpreters from the KU Space Technology Center. This project made use of the processing capability and human interpretive capability currently existing.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Kansas State Government - Topeka

5.0017, EVALUATION OF REMOTELY SENSED DATA FROM THE RHODE RIVER ESTUARY WATERSHED

F.S. WILLIAMSON, Smithsonian Institution, *Edgewater*, *Maryland* 21037

Objectives: Remote sensing of environmental parameters from aircraft has proved to be a valuable monitoring method for both terrestrial and aquatic research throughout the United States. A cooperative investigation of the uses of remote sensing for research in the Rhode River watershed has been carried on from 1970-1973 between the Smithsonian Institution and the National Aeronautics and Space Administration (NASA). The current project expands applications of remote sensing from the Rhode River watershed to salt marshes on Maryland's Eastern Shore. Automated data analysis is being used to evaluate vegetation data obtained both in the field and by remote sensing of test areas.

Specific objectives are: 1) To determine whether there are stable, predictable relationships between phenological and morphological characteristics of plants and the spectral characteristics obtained by remote sensing, 2) To develop a classification system for wetland management use, using correlations between plant phenology, morphology, and spectral responses, 3) To test the classification system on marshes distant (i.e., further than 15 miles) from those where the system was developed.

Progress to date: Vegetation mapping of six test sites on the eastern shore of Chesapeake Bay has been completed. The maps are being used in preliminary investigations of classification techniques. More detailed vegetation data is being gathered from three additional test sites, which will be used to analyze relationships between marsh plant communities.

SUPPORTED BY Smithsonian Institution

5.0018, GARP ATLANTIC TROPICAL EXPERIMENT (GATE)

J.L. RASMUSSEN, U.S. Dept. of Commerce, Off. of Environ. Monitoring, *Rockville*, *Maryland* 20852 (2522)

Main objectives of GATE are to study structure and evolution of tropical weather systems to assess how these affect the total atmospheric circulation. Interaction between weather and oceanic phenomena of various scales will be studied in an effort to improve weather forecasting by computer models.

An extensive international observational program was conducted over the tropical Atlantic and adjacent continental regions from June 15 - September 23, 1974. This field phase, operated from Dakar, Senegal, resulted in the accumulation of vast amounts of meteorological and oceanographic observations from 39 ships, 12 aircraft and six satellites. The data are now being processed at National Processing Centers (in ten different countries). By March 1976, all data will be submitted to the World Data Centers in the U.S. and U.S.S.R. for archiving and distribution to scientists. Preliminary data sets are available now from these centers. International validation and adjustments will be done in Subprogram Data Centers in five countries. These data also will be available to scientists through the World Data Centers. This work will be completed by April 1977.

The U.S. GATE Research Program consists of over 110 Principal Scientists at over 40 institutions. The scientific analysis will continue for several years and specific efforts are underway to coordinate and schedule the program so that the synthesis of GATE results is attained by FY 1979.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0019, CELESTIAL ASPECT SYSTEM

R.G. STEEVES, Epsilon Laboratories Inc., *Bedford*, *Massachusetts* (DF245560; F19628-74-C-0111)

AF function - probing the aerospace environment. Deficiency or opportunity - inability to forecast atmospheric interactions affecting the design and operation of AF systems such as reentry vehicles, over- the-horizon radar, and satellite operations. Objective - to establish methods to control sounding rocket orientation during powered and coasting flight. How research contributes - permits optimum exposure of scientific apparatus carried on sounding rockets to sense aerospace variables and controls trajectory so as to minimize deviation from desired flight plan.

Star sensing system will be developed to provide telemetered celestial attitude to within 0.1 degree. The system is very versatile requiring no vehicle motion up to very perturbed vehicle motion. It will function under day or night conditions. For coasting flight control, a new low-cost celestial aspect system will be upgraded to provide a tracking capability by producing a voltage proportional to the deviation of the stellar image from the desired position in the instrument's field of view. This voltage will be conditioned to control cold gas actuators so as to achieve selected angular orientation of the rocket payload.

Supporting agency address information: AF Cambridge Research Laboratories LC, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0020, TUNABLE LASERS FOR APPLICATION TO AIR POLLUTION MEASUREMENTS

A. MOORADIAN, Mass. Inst. of Technology, Lincoln Laboratory, *Lexington*, *Massachusetts* 02173 (AEN71-01922 A02)

The objective is to catalog the high resolution spectra of light hydrocarbons and other low molecular weight air pollutants in the range 2.2 to 4.2 micrometers using the recently developed difference-frequency laser spectrometer. The survey is aimed at obtaining the spectral signatures and absorption strengths of many common air contaminants for purposes of identification and measurement in programs of research on atmospheric chemistry and pollutant monitoring.

SUPPORTED BY U.S. Natl. Science Foundation

5.0021, EXPERIMENT DESIGN AND ANLYSIS OF MEASUREMENTS FROM ROCKET AND SATELLITE INVESTIGATION

L. BURKE, Regis College, Undergraduate School, *Weston, Massachusetts* 02193 (DF243670; F19628-75-C-0081)

AF function - surveillance, communication, navigation, ionosphere and magnetosphere modelling. Deficiency - inadequate knowledge of the electrical properties of the ionosphere and magnetosphere for design needs of AF systems. Research - design of rocket and satellite experiments, analysis and synthesis of rocket and satellite probe results. How research contributes - permits improved military space vehicle design, provides data essential to radar propagation predictions, provides data essential for the design and utilization of communications, guidance and surveillance systems and provides understanding of dynamical processes in the ionosphere and magnetosphere. It contributes to the understanding of spacecraft charging and provides recommendations on the solution of charging problems. The objective of this work includes the design of instruments for the study of electric fields and plasma motion in the outer atmosphere and the analysis and synthesis of space flight results. Studies include the determination of high altitude current systems, ionosphere-magnetosphere coupling mechanisms and the significance of plasma turbulence and motions.

Supporting agency address information: AF Cambridge Research Laboratories PH, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0022, MATHEMATICAL AND METEOROLOGICAL STUDIES IN SUPPORT OF RESEARCH

B. LEONARDA, Regis College, Undergraduate School, *Weston, Massachusetts* 02193 (DF245950; F19628-75-C-0074)

AF function - weather analysis and forecasting for military operations. Deficiency - inadequate weather forecasts. Research - applies advanced techniques to development of improved weather analysis and forecasting techniques. How research contributes - provide improved weather analysis and forecasting techniques in the following areas- atmospheric sounding devices (T667001), relationship between satellite data and surface observations (669802), optimizing co-location of information from various satellite sensors in terrestrial coordinates (ABRES), boundary layer turbulence (T765502), mathematical models (T860410), visibility changes due to translation (T862811), and verification of stratospheric environmental quality (T668709).

Supporting agency address information: AF Cambridge Research Laboratories LY, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

5.0023, FEASIBILITY OF USING EARTH RESOURCES TECHNOLOGY SATELLITE (ERTS) DATA FOR ACQUISITION OF TERRAIN INFORMATION FOR MILITARY PURPOSES

J.K. STOLL, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180 (DA0P8181)

The objective of the research is to determine the feasibility of using ERTS-1 data to obtain terrain data on soils, geology, vegetation, and water bodies as related to military planning and operations.

There is a dire need for military geographic intelligence (MGI) products on areas of interest to the military, such as the Middle East and Europe. In most cases very little, if any, quantitative terrain data are available that can be readily used for obtaining performance estimates for selected materiel systems. Also, in some areas such as the Middle East there is very little conventional photography that could be used as a source for obtaining needed terrain information. Under this study, ERTS data will be analyzed to determine the feasibility of delineating such things as soil type, vegetation type, geology, and surface water. The ERTS data which contain spectral reflectance measurements for four spectral bands (0.5-0.6, 0.6-0.7, 0.7-0.8, and 0.8-1.1 micrometers) over the terrain surface will be correlated with terrain data obtained from national intelligence surveys (NIS's) and possibly some ground truth data obtained by WES in support of another study. A report will be prepared on the study during first quarter FY76.

Supporting agency address information: OCE Waterways Experiment Station, P.O. Box 631, Vicksburg, Miss. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

5.0024, HYDROLOGY OF STREAMS IN ST. LOUIS METROPOLITAN AREA

D.W. SPENCER, U.S. Dept. of the Interior, Geological Survey, *Rolla, Missouri* 65401 (MO 68-013)

Four major drainage basins in the metropolitan St. Louis area are now being used to drain uncontrolled storm water from many urbanized areas. Storm waters carried away by these streams are increasing with increased urbanization, causing greater flooding and erosion. Little or no information on the hydrologic characteristics of these basins is available, nor is any available on the effects of urbanization on the basins' runoff. Knowledge of the hydrologic characteristics and the effects of urbanization will be a valuable tool in the economic and effective design of channel improvements now and in the future.

Furnish designers and planners basic information on the hydrologic characteristics of the project basins. To analyze basic hydrologic data to determine frequency of flooding and effects of urbanization upon the rainfall-runoff relationship.

Approximately 100 crest-stage gages will be constructed along each stream to record flood profiles. Through interviews of local residents historic flood elevations will be used to develop flood-inundation maps. Continuous recorders placed near the mouth of each basin will provide stage-discharge relationships that will indicate basin discharge. Flood-hydrograph recorders with synchronous continuous rainfall recorders located near the centroid of each basin along the stream channel will be used as an aid to define urbanization effects. Urbanization effects will be shown by relating lag time between mass of rainfall and mass of runoff to basin characteristics.

All rainfall data tapes were translated through 1972 and rating curves for those stations determined to have sufficient data for model study were drawn. The gage network was re-evaluated and gages with insufficient data to rate or those considered to have poor hydrologic characteristics were discontinued. Initial efforts were made to investigate various basin parameters. An efficient method utilizing existing aerial photos and photo maps was devised to determine percentage of imperviousness.

Continue collection of rainfall, stage, and discharge data. Analysis of data for a report on rainfall-runoff relationship. Reduce the number of recording gages to the ones that have ratings or the best chance of rating. Enter all data gathered to data on disk storage and commence calibration runs and synthesis runs on long-term rainfall.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

5.0025, APPLICATIONS OF METEOROLOGICAL KNOWLEDGE TO FIRE MANAGEMENT

D.M. FUQUAY, U.S. Dept. of Agriculture, Northern Forest Fire Lab., *Missoula, Montana* 59801 (0000312; INT2101)

OBJECTIVE: Develop an applied lightning fire risk component for the National Fire-Danger Rating System. Develop a comprehensive summary of the state-of-the-art in lightning abatement and its implications for present and future applications in forest resource management. Develop methods, techniques, and systems for acquisition and application of meteorological information to fire management.

APPROACH: Through laboratory and field studies and contract and grant research, develop a stochastic lightning-risk model from existing data on lightning occurrence, fire weather, and fire occurrence, evaluate the effectiveness of lightning modification experiments using statistical and numerical techniques, and develop and apply meteorological knowledge to fire management problems.

PROGRESS: A predictive model for lightning fire ignition is being developed as a means of relating the probability of fire ignition to the nature of lightning storms, fuel conditions, and meteorological elements. The model will serve as a lightning-fire risk factor for the National Fire-Danger Rating System and as a guide for estimating fire risk aspects of land management prac-

tices. A cooperative lightning modification study between the USDA Forest Service and the Bureau of Land Management was initiated in 1973. First results show Alaskan storms to be relatively small, isolated, and less active electrically than western Montana storms. Nine unseeded storms produced 123 lightning discharges of which only 8 were cloud-to-ground (CG). Seven of the 8 CG discharges produced only one return stroke each. Only one recorded discharge produced long-continuing current of the type known to start fire in Montana. Statistical analysis of the effect of AgI cloud seeding is continuing. A compact airborne lightning recording system was developed consisting of four lightning sensors, a magnetic tape recorder, and supporting electronics. The system is used to detect lightning, discriminate between intra-cloud and CG lightning, count return strokes, and determine the frequency and time duration of continuing current in hybrid lightning. Strong winds were the major weather factor in the spread of the Sundance Fire in Northern Idaho in 1967.

SUPPORTED BY U.S. Dept. of Agriculture - F.S.

5.0026, TURBULENT DIFFUSION IN THE URBAN ATMOSPHERIC BOUNDARY-LAYER
R.L. PESKIN, Rutgers the State University, School of Engineering, *New Brunswick, New Jersey* 08903 (ENG74-05295 A01)

This action shall provide additional funds and extend GK-4389X another year. The objectives of this program are the acquisition and analysis of turbulent statistical space-time quantities for the atmospheric boundary-layer, and the application of these data to estimate the turbulent diffusion, pressure fluctuations, and other flow quantities of interest in wind engineering.

SUPPORTED BY U.S. Natl. Science Foundation

5.0027, EQUIPMENT TO COMPLETE THE LIGHTNING-RAIN GUSH DATA COMPUTATIONAL FACILITY
C.R. HOLMES, New Mexico Inst. Min. & Tech., Graduate School, *Socorro, New Mexico* 87801 (DES75-07719)

This grant will update a modest data facility assembled around PDP- 11 minicomputer which gathers data from a network transmitting rain gauges. The system simultaneously will process thunder recordings and data from radar. The network situated at the Langmuir Laboratory of the New Mexico Institute of Mining and Technology is aimed in particular at the lightning rain gush research problem.

SUPPORTED BY U.S. Natl. Science Foundation

5.0028, REMOTE SENSING TRAINING PROJECT
H.W. GRUBB, State Div. of Management & Sv., *Austin, Texas* 78711

The primary expected benefit of the Remote Training Project is to train personnel in each agency to utilize a wide range of remote sensing products in the accomplishment of agency missions. It is expected that trained personnel will be able to accomplish the following: (1) Utilizing the advanced technology of remote sensing to acquire basic natural resources data and information, (2) contributing to the design and implementation of natural resources information system, and (3) recognizing areas of application of remote sensing technology in single agency and multiple agency products.

The Remote Sensing Training Project proposes to involve the NASA Johnson Space Center, Governor's Office of Information Services, University of Texas, Departments of Geography and Engineering, Bureau of Economic Geology personnel, and Perdue/LARS in a series of class presentations in remote sensing to State agency personnel. The series of classes will be of 7-week duration and be repeated five times. The training plan is designed to best utilize the capabilities of the above organizations at minimum cost.

Other jurisdictions may be interested in the training materials and methods developed as a part of this project.

SUPPORTED BY U.S. Civil Service Commission

5.0029, MAPPING OF THERMAL POLLUTION BY IRLS OF COOLING WATER
H.W. VANHULTEN, Netherlands Comm. Rem. Tech., *Delft, the Netherlands*

Problem and objective: The discharge of warm cooling water to surface water results in a rise of temperature that may have serious consequences for the aquatic environment and for navigation. The coolant is discharged by power stations or by chemical industries. The excess-temperature is prescribed by (preliminary) regulations. The dispersion of heat both in horizontal and vertical direction depends on factors such as water currents, wind, heat transmission to the air and turbulent diffusion. With the aid of measurements and computer models an attempt is made to formulate meaningful statements concerning acceptable excess-temperatures, depending on conditions of the surface water into which the coolant discharges. The objective is to determine the temperature distribution at the surface (and if possible below the surface of a waterbody by means of infrared recordings (IRLS) from an aeroplane. (In this way illegal discharges of coolant can also be traced.) A combination of these data with measurements from temperature sensors fixed in the water at several depths can result in a classification of the condition of a water body (types of stratification or homogeneous temperature distribution).

Experimental: Infrared recordings are performed over power stations. At some points in this area the vertical temperature distribution is determined by means of sensors. Besides, a radiational thermometer at the surface of the water is utilized for the calibration of the infrared recordings. These observations are 'translated' into temperatures. Corrections are made regarding the geothermal distortions. This results in maps of absolute isotherms. Relative isotherm maps are also of substantial importance for an interpretation of the heat distribution.

Addenda: Performing organization: Nederlandse Interdepartementale Werkgemeenschap voor het Applicatie-onderzoek van Remote Sensing Technieken NIWARS.

SUPPORTED BY the Netherlands - Min. of Tran. & Pub. Wks

5.0030, ENERGY DISTRIBUTION AND TRANSPORT IN THE TROPICAL TROPOSPHERE
C.I. ASPLIDEN, Univ. of Virginia, School of Arts, *Charlottesville, Virginia* 22903 (OCD74-21299)

The objective of this research is to use and refine the BOMEX data through use of a budget technique that involves the classification of radiosonde data into atmospheric modes or energy states based on the rate of cumulus convection. All other measurements such as radiation and precipitation rates, sensible and latent heat transports also will be classified into modes. The convective transports will be parameterized based on a cumulus model utilizing routine radiosonde observations. Together with model averages of measured sinks and sources, the vertical distribution of large scale vertical motion and divergence can be obtained for a column of air in the tropical troposphere. A good statistical estimate of the short wave radiation induced humidity error and its variations with cloud conditions and energy states will be obtained by comparing day and night soundings for each category. Finally, a mesoscale pilot balloon field program is planned on the Island of Barbados in order to obtain a statistically representative sample of soundings in the lower tropical, maritime troposphere for the purpose of delineating the complex structure of the windfield and its variations.

SUPPORTED BY U.S. Natl. Science Foundation

5.0031, ON CUMULUS MERGERS
J. SIMPSON, Univ. of Virginia, School of Arts, *Charlottesville, Virginia* 22903 (DES75-03984)

This investigation centers on a study of the merger of two or more precipitating cumuli by calibrated radar. A 'successful' merger is defined by three criteria, namely 1) the isopleth of rain rate of 1 mm hr-1 becomes joined between two or more previously separate radar echoes, 2) the merger lasts ten minutes or more and 3) the merger produces 343 x 10 to the 3rd power cubic meters or more precipitation (about 280 acre-ft). Mergers will be studied in a 40,000 sq. mile area in south Florida for the 94-day period between 11 June and 12 September, 1973, corresponding

to the operation of FACE 1973 (Florida area cumulus experiment). Tabulations will be made of the location, lifetime, area and precipitation of each merger. These will be related to synoptic, mesoscale and boundary layer conditions and compared with properties of isolated non-merged clouds. Distribution functions will be fitted to merger rainfall in attempts to make models of south Florida precipitation to use in simulation, prediction, and experimentation. Stratification of data will be made on the basis of synoptic conditions, rain amounts, echo motions, and other variables in order to relate different rain distributions to specifiable covariates. Merger populations will be compared with predictions of mesoscale models, in particular, the Florida peninsula model of Pielke. Case studies will be undertaken to learn about the physics and dynamics of merger, its feedback upon the precipitation and severe weather-generating processes and its relationship to environmental parameters. The FACE data base, consisting of aircraft, surface, sounding, and radar data (including several days of dual Doppler) should lead to greater ability to understand, predict and conduct controlled experiments upon this important aspect of cumulus interaction.

SUPPORTED BY U.S. Natl. Science Foundation

5.0032, EFFECTS OF LONG-TERM GREAT LAKES WATER LEVEL CHANGES
C.J. GALVIN, U.S. Army, Coastal Engineering Res. Ctr., *Fort Belvoir, Virginia* 22060 (31195)

Objective: To provide guidance, in the form of published reports, for Corps planning that will anticipate the effect of the next cycle of high water levels on the Great Lakes.

Approach: Office, field, and laboratory studies will examine the effect of long-term lake level changes on representative shoreline segments of the Great Lakes. (1) Office Studies will select, with NCD assistance, the representative shoreline segments, and examine their past shoreline changes as a function of lake level. Published documents, charts, and aerial photos will be the primary sources of data. A primary aim of this aspect of the study will be to establish, for each shoreline segment, an upper critical lake level above which shore erosion is universal, and a lower critical lake-level below which shore erosion is negligible. These critical lake levels with supporting data, will be published as one or more CERC Technical Memoranda. (2) Field studies will concentrate on selected shoreline segments that are now eroding, and in particular, the bluff or scarp geometry behind the eroding beach. The position of the edge of the bluff will be located with respect to recoverable cultural or natural features, and identified on recent aerial photography. The height of the bluff, its composition, and its base elevation will be measured. The shore condition will be described and photographed during personal inspection. This field aspect of the study will insure that the bluff position is recoverable in future studies, assist in correlating bluff composition with resistance to erosion, provide data for sediment budget studies, and provide 'baseline' information for future engineering studies. This field work will be published in a series of CERC Technical memoranda. Such field work has been in progress at 17 sites along a 250 mile stretch of the eastern Lake Michigan coastline since August 1970. Additional sites will be monitored by surveys or aerial photography techniques. (3) Laboratory studies will investigate the response of eroding shorelines to combinations of offshore hydrography, water level, wave conditions, and beach and bluff conditions. This aspect will aim to establish generalized predictions for the response of shores to changes in water level. These experiments will be published as CERC Technical Memoranda. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense - Army

5.0033, PLANETARY BOUNDARY LAYER OBSERVING FACILITY
J.D. MARWITZ, Univ. of Wyoming, School of Engineering, *Laramie, Wyoming* 82070 (DES75-03200)

This grant is for a planetary boundary layer (PBL) observing facility. The facility will primarily be used to examine the unique PBL which occurs around the mountains of Wyoming. This is of critical importance because of the rapid development of several coal fired thermal-electric and coal gasification plants which are being built and expected to be built in this region. The PBL observing facility will consist of: (a) radio controlled drone aircraft with an on-line mini- computer for calculation and display of state parameters, (b) monostatic acoustic echo sounder and (c) kytoon system. The system will be housed in a specially built mobile camper and will supplement the Department of Atmospheric Science's existing instrumented Queen Air aircraft.

SUPPORTED BY U.S. Natl. Science Foundation

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, SYSTEMS APPROACH TO TRAINING
J.F. FUNARO, U.S. Navy, Human Factors Laboratory, *Orlando, Florida* 32813 (DN594000)

Develop procedures/models which will permit the deliberate and orderly planning of specific aircraft instructional programs necessary to ensure that personnel acquire the knowledge, skills, attitudes and behaviors essential for successful job performance in a specified aircraft. The models will include selection of the appropriate analyses necessary for performance parameter development and specification of training/behavioral objectives and will provide a basis for the selection of instructional material, methods, media, and equipment necessary for the development of an optimal, cost effective curriculum.

The program will be accomplished through a prudent utilization of Navy and contractor personnel. The program efforts will be limited to operator and tactical positions of selected naval aviation systems. The program will be divided into four phases: Phase I - research and plan formulation - a literature review and analysis of existing principles and techniques used in the systems approach to training. Phase II - instructional strategy - data availability during the system development cycle will be identified and its application, timeliness, form and level of detail accessed. Phase III - system development and implementation - a sample instructional system will be developed for selected candidate systems. Phase IV - curriculum validation plan - the sample instructional programs will be used in conjunction with management guidelines to implement and validate the approach.

Supporting agency address information: Naval Air Systems Command, Research and Technology, Washington, D. C. 20360

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0002, STUDIES OF ORIENTATIONAL AND POSTURAL MECHANISMS IN A MODEL NEURAL SYSTEM
L.S. DEMSKI, Louisiana State Univ. Systems, Graduate School, *New Orleans, Louisiana* 70122 (DF040650; AF-AFOSR-2803-75)

AF function - an important facet of the AMD/AMRL program is directed toward the analysis of aircrew performance in operational flight conditions. An understanding of what portion of the central nervous system is involved in processing information in order to carry out performance activities under conditions of pitch, yaw, and roll is important in developing man-machine environmental systems to optimize operator performance. This is especially important with proposed increased weapon-system sophistication. Deficiency - it is well established that the vestibular system of the ear play an important role in defining behavior in spatial orientation. Little information is available on the nervous control of that system. Research - this project, utilizing an already developed animal model, will map and explore the role of various portions of the brain in controlling or influencing the vestibular systems. How research contributes - knowledge derived from these studies should be applicable to human operator systems and supports research identified under AFSC RO 1.6 and RO 1.7.

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0003, BIODYNAMICS HIGH MACH ESCAPE SYSTEM
P.R. PAYNE, Payne Incorporated, *Annapolis, Maryland* (DF318600; F33615-75-C-5096)

The objective of this effort determines the aerodynamic and inertial forces acting on the crewman during emergency escape from aerospace vehicles operating within high Mach flight regimes. Sea experiences have demonstrated an increased incidence of high speed ejection and higher windblast injury and fatality rates under combat conditions. Poor escape system stability and inadequate crew protection equipment are the causative factors. Newer tactical and strategic/reconnaissance air vehicles are capable of sustained flight at higher velocities. Advanced conceptual systems will operate at very high Mach. This contract will provide aeromedical criteria for escape systems designed to meet the hazards associated with these flight regimes.

An experimental program will be conducted to measure the aerodynamic properties of the human body and the aerodynamic pressure distribution over the body. An analytical study will be performed to quantify the aerodynamic, thermodynamic and inertial loads acting on the crewman under high Mach conditions using experimental data from low velocity tests with volunteers and high velocity tests with models. Protection systems will be conceptualized to meet the requirements of high Mach, high dynamic pressure and high pre-ejection acceleration conditions. Methods of providing unified exposure limits for accelerations and aerodynamic forces will be studied and proposed for escape system design criteria.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0004, DETERMINATION OF PILOT DYNAMICAL EQUATIONS FOR VULNERABILITY ASSESSMENTS

R.W. DOHERTY, R D P Incorporated, *Bedford*, *Massachusetts* 01713 (DF318210; F41609-75-C-0009)

AMD is responsible under AFR and AFSC 80-38 for defining the effects of threat level nuclear radiation on man's performance capabilities for strategic weapon systems such as the B-52 and B-1 bombers. Radiation effects data are used for crew vulnerability assessments and predictions of task and mission completion. Mathematical models are employed to accomplish these estimates. In particular, linear differential equations are used to study various control tasks arising in Air Force military missions including aircraft piloting, gunnery, etc. The human operator is treated as a subsystem within a control loop and his input-output relations are described by the differential equations. The effect of radiation on these equations is determined through experimentation with rhesus monkeys who are trained to control a ground based simulator by manipulation of a 'joystick.' The necessary experiments have been performed, the data collected and analyzed to the point of obtaining auto- and crosspower spectral density functions. The purpose of this effort is to determine valid laplace transforms and remnant spectra for individual subjects from this spectral data, and then determine a valid population description of the subject group before and after irradiation at various dose levels.

This effort will consist of two phases. The first phase involves the development of statistically correct methods for determining laplace transforms and remnant spectra for individual subjects. Based on these individual laplace transforms and remnant spectra, a rigorous population description of the subject group including delineation of radiation induced changes, must be provided. The second phase of the project involves the application of the methodology defined in the first phase to the analysis of the available spectral data. These data consists of 14 samples taken pre- and post-irradiation from 30 monkeys with 10 monkeys in each of three different radiation dose groups.

Supporting agency address information: USAF School of Aerospace Medicine RA, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0005, APPLICATION OF FERROFLUIDIC TECHNOLOGY TO PROBLEMS OF PRESSURE SUIT DESIGN

R. MOSKOWITZ, Ferrofluidics Corporation, *Burlington*, *Massachusetts* (DF318760; F41609-75-C-0012)

Widespread use of pressue suit equipment has in the past been plagued with limited aircrew acceptance and complex/costly support requirements. User dissatisfaction has centered about the poor mobility, visibility, encumberance, and distraction afforded by past/present designs, while their complexity and specialized handling requirements have incurred maintenance, training, and direct mission-support (launch and recover) responsibilities. In view of these difficulties, the present effort has focused upon development of design principles offering simplicity, reliability, and compatibility with user requirements. One such approach involves the possible employment of 'ferrofluid' materials in future suit development.

Ferrofluids are magnetic liquids useful in the formation of hermetic seals and bearings. High differential sealing capability and low (pressure independent) torque properties can be achieved in simple and compact designs. Application to mobility-enhancing ring seals is readily apparent, but other less obvious areas of employment may also exist. For these reasons a firm skilled in the use of this technique has been contracted to provide guidance in defining the capabilities and application of ferrofluid technology. The contractor will prepare and submit a feasibility study addressing the application of ferrofluid techniques to problems of pressure suit design. The study will include, but is not limited to, production of engineering design materials necessary in the construction of prototype neck and wrist seal/thrust- bearing assemblies, the applicability of ferrofluid technology to improvement of pressure-sealing slide fasteners, the interfacing of different pressure modalities, and emergency compartmentalization of full pressure suits.

Supporting agency address information: USAF School of Aerospace Medicine VN, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0006, INVESTIGATION OF CLUSTERING TECHNIQUES FOR CARDIOGRAM CLASSIFICATION

D.E. GUSTAFSON, Charles Stark Draper Lab. Inc., *Cambridge*, *Massachusetts* 02139 (DF318720; F41609-75-C-0019)

The USAF Central Electrocardiographic (ECG) Library, established to assist in the validation of criteria for the selection/retention and medical maintenance of flying personnel has, to date, accumulated more the 750,000 individual ECG records. The purpose of this contract is to continue development of algorithms, based on signal analysis techniques, for classifying both electrocardiograms and vectorcardiograms (VCG). This is the third step in a continuing research program, the ultimate objective of which is the automated separation of ECG's into abnormal and questionable categories. It is anticipated that successful completion of this contract will result in the extension of present algorithms and development of new algorithms.

The overall research approach will consist of three categories of investigation, with all development work evaluated using actual ECG/VCG data. (1) The development of preprocessing algorithms which function to produce a single representative heartbeat free from noise and artifacts. (2) Further investigation of feature extraction using Karhunen-Loeve (K- L) expansion and determination of the appropriate ensemble correlation matrix. (3) Investigation of clustering techniques by means of unsupervised learning to investigate 'natural' clustering of data, employment of supervised learning based on cardiologist diagnoses to enhance class separability, and a combination of both the above to give overall best class separation in feature space and maximize pattern recognition accuracy.

Supporting agency address information: USAF School of Aerospace Medicine NG, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0007, ELECTROCARDIOGRAM DIGITIZER SYSTEM (OPTICAL SCAN CAPABILITY)

D.C. FRASER, Mass. Inst. of Technology, Charles Stark Draper Lab., *Cambridge*, *Massachusetts* 02139 (DF318480; F41609-75-C-0007)

The USAF Central ECG Library currently houses some 900,000 electrocardiograms (ECG), the majority of which are on microfilm placed in transparent microfilm jackets. Because of their value in conducting research on ECG problems in aircrewmen, it is important to be able to digitize ECG's directly from microfilm. The purpose of this contract is to develop optical scan technology to automate conversion of ECG's from analog records

into digital format suitable for digital computer analysis. This will entail definition, fabrication, delivery, installation and demonstration of a system for automated digital conversion of strip chart or microfilm records by optical scan techniques.

This effort is an expansion of a system for digitization of original electrocardiograms acquired by the USAF School of Aerospace Medicine under Air Force contract. The areas to be investigated include: (1) utilization of a 512 element solid-state scanning array or equivalent device which will allow relatively rapid scanning, (2) utilization of an electric threshold approximately one half way between the extremes of array signal output and transmitting only the addresses of the transitions across the threshold to the computer to reduce the amount of data from 512 to less than 12 words per scan, (3) attainment of a speed of 5 seconds per lead or 60 seconds per record, with the major speed limitation being the curve tracing program, and (4) attainment of a stand-alone operation which is capable of being integrated with the current USAFSAM ECG digitizer system. The final system design will be dependent upon approval by the technical contract monitor who will base his decision upon information supplied by the contractor when system trials have reached an adequate stage of development to provide the data necessary for system definition.

Supporting agency address information: USAF School of Aerospace Medicine NG, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0008, HUMAN MUSCULOSKELETAL TOLERANCE LIMITS TO EJECTION AND RELATED HIGH MECHANICAL STRESS ENVIRONMENTS

A.H. BURSTEIN, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (DF040880; AF-AFOSR-2820-75)

AF function - the Air Force is experiencing an unacceptable level of extremity injuries associated with ejection from high performance aircraft, ground landings following ejection, and crash landings. Such injuries are often immediately disabling and often lead to long-term disability due to later arthritis and joint instability. This situation is expected to continue as faster and more sophisticated weapon systems are added to the operational force. Deficiency - human failure indices are needed in order to predict and prevent musculoskeletal injuries. Only scant information and data is available on the failure properties and tolerance limits of human joint and ligament structures. It is difficult to extrapolate strength properties of the sub-human primate musculoskeletal system to man. Approach - human surgical and amputation specimens are available at Case Western Reserve for destructive mechanical tests which will provide a data base for developing scaling laws and dynamic response index. How research contributes - this research directly supports problems identified in AFSC RO 1.6 'Mechanical Force Environments.'

Supporting agency address information: AF Office of Scientific Research NL, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0009, DIGITAL INFORMATION SYSTEM PERFORMANCE ASSESSMENT

B.M. CRAWFORD, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319210)

The objective is to develop and verify compatible taxonomies and metrics for air force crew performance capabilities consistent with the functional requirements and mission objectives of advanced digital information processing and presentation systems. The verified taxonomies and metrics will be used to establish human engineering design criteria and man-machine functions allocations for advanced systems and to evaluate alternative concepts for proposed systems on the basis of systems and functions analyses. Potential applications of the resultant techniques include digital avionics information system ADP efforts and advanced command-control system development programs.

Hypotheses as to 1/ the nature of behaviors required by representative crew perceptual, cognitive, and performance functions in digital information system context, e.g., advanced all-digital cockpits, and 2/ quantitative estimates of associated workloads will be made on a priority analytic bases using established behavioral taxonomies, e.g., psychomotor response execution, etc., and information theory metrics, i.e., uncertainty reduction or information processing rate in bits/sec. The resultant hypotheses will be tested experimentally in simulated systems with man-in-the-loop performing primary crew functions with measures derived from compatible secondary loading tasks used to complement measures of primary task performance in assessing workload and reserve capacity for the various behavioral capabilities.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0010, MECHANISMS OF NONDESTRUCTIVE COUNTERMEASURES AGAINST THE HUMAN VISION SYSTEM

E.J. HARTZELL, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF318860)

At some point in effective threat systems, there is at least one human operator serving in a primary or backup role as a system controller. The human operator controls his system on the basis of visual information about the position and relative motion of the target. The objective of this effort is to investigate psychophysical mechanisms which may be effective countermeasures against the human vision system. The work will be coordinated with the AF Avionics Laboratory and the U. S. Navy Missile Test Center, Point Mugu, Ca. The results of this effort will relate the mechanisms underlying successful empirical experiments conducted in the past and in progress jointly sponsored by these organizations as well as the U. S. Army.

The approach involves a series of human experiments utilizing the computational and simulation facilities at the AMRL. Human performance will be evaluated, presence of potential countermeasures including: frequency of flashing lights, signals having patterns or cognitive value, varied signal intensity and varied wavelength. Of particular concern is the display media and task viewing mechanisms.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0011, TARGET ACQUISITION PREDICTION

R.L. HILGENDORF, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319150)

The purpose of this effort is to apply the methodology, data representation techniques and combinatorial rules/models/algorithms developed under other efforts to systematically portray the combined effects of advanced sensor control, and display transfer functions, scene composition, human psychovisual capabilities and environmental parameters on target acquisition performance. The results of this work will be in direct support of the Target Acquisition Working Group (TAWG) of the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME). This work will also fulfill requirements as specified in TPG SO-RTA, TPG MS-RTA and TPG RPV-RTA.

Performance characteristics of conceptual and avanced sensors and display media will be quantified and their effect convolved with image characteristics and human visual describing/demand functions to provide models of target acquisition performance. Both real-time, man-the-the- loop simulation and flight tests will be employed to validate the constructs and content of the models. Concurrently, selected portions of existing models will be screened to determine their applicability to sensor/display subsystem and dynamic operational effects modeling. In addition, the effects of alternative image processing/enhancement techniques will be defined to determine the contribution of conceptual and advanced component functions on model structure, elements and output. Where feasible, sensitivity testing of model outputs to changes in parameters of known operational capabilities and associated effectiveness measures developed under this effort will be performed.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0012, CREW FACTORS IN THERMAL STRESS
A.T. KISSEN, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF318970)

To investigate and compare protective and performance improving concepts in thermal stress environments. Results of these tests are used directly by requesting development agencies within ASD (ASD/SML, ASD/EN, etc) in development and procurement decisions.

Compare results using different protective items or concepts on the physiological and performance responses of subjects in extreme thermal environments. Present areas of interest include head cooling concepts for fighter type aircraft, breathing quality requirements in fire proximity suits, optimum protective clothing development techniques using infrared scanning, and testing of new clothing insulation materials and techniques, such as cold sea survival garments compatible with pilot and mission requirements.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0013, PILOT USE OF FORCE VECTORING IN AIR COMBAT MANEUVERING
D.R. LOOSE, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319060)

To aid AFFDL in responding to technical need AFFDL-AMD-0602-74-3 to develop techniques to exploit the maneuvering potential of vectored force fighters in air-to-air and/or air-to-ground combat. Vectored force design concepts appear to be very promising in creating combat-effective weapon systems, if the human component of the system can perform in stress environments of combined longitudinal, lateral and normal acceleration. Proper evaluation of aircraft capability versus human tolerance tradeoffs, and optimal aircrew-machine interfacing are critical in realizing the full potential of vectored force fighters.

Preliminary efforts for FY75 will involve development of necessary simulation techniques, and simulation of selected portions of the flight envelope on the DES. The gain in combat effectiveness due to utilization of several promising vectored force concepts will be examined. As use of these new concepts and the ability of the DES to simulate the relevant acceleration stresses are further defined, quantitative measurements will be taken and the optimum performance improvement allowed by the tactical flexibility and performance decrement caused by the new stress environment.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0014, PILOT PERFORMANCE ASSESSMENT TECHNOLOGY
D.R. LOOSE, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319070)

To provide a continuously reacting, realistically maneuvering target for use in air combat tracking and gunnery tasks, which form an integral part of air-to-air combat simulation on the dynamic environment simulator (DES). To implement offline and real-time subject performance measurement techniques for use in DES experimentation providing both measures for use in subsequent evaluation and elementary performance quality feedback to experimental subjects. The maneuvering target and performance assessment techniques are essential aspects of valid simulation and analysis in this area, their use ensuring that the experimental results are directly correlatable to real world situations.

The 'smart target', continuous performance metrics, and gun model developed by Quest Research Corporation will be adapted and modified for appropriate use in DES experimentation. This process will involve implementation on in-house computer facilities and interfacing with existing DES closed loop control computers and software, followed by a testing and modification phase when variable elements (such as aircraft dynamic parameters and measure selection) will be optimized.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0015, DISPLAY TECHNIQUES FOR CLOSED LOOP HUMAN CENTRIFUGE SIMULATION
A.R. MARKO, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319090)

The dynamic environment simulator (DES) is employed to produce inertia forces on a human test subject similar to forces experienced in aircraft in combat. This centrifuge is used to measure human tracking and ordnance delivery performance, test new cockpit designs, evaluate protective equipment and determine safety limits for human exposure to g forces. It is the objective of this effort to develop improved displays for the dynamic environment simulator in order to provide realism of displays in studies on manned weapon system effectiveness in the air combat arena.

A display system based on a television technique has been selected because of inherent versatility. Input to the display will be a video signal generated from simulator facilities, terrain boards, flying spot scanners, or computers. A spherical mirror together with a 23 inch television monitor or projection system will be used. Flight simulator displays have been evaluated for potential use in the des. Components for the construction of a first laboratory model display have been selected and ordered. Preliminary electronic circuit design work has been started.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0016, VISUAL PROCESSES IN PERCEPTION OF REAL AND DISPLAYED INFORMATION
W.L. MARTIN, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319160)

To determine operator psychovisual processes and capabilities associated with the perception of information on both imaging and nonimaging displays. To establish human factors design criteria for conventional (e.g. CRT) as well as advanced display media (e.g. flat panel displays using light emitting diodes, plasma panel and liquid crystal elements). Effort is coordinated with the Army Night Vision Laboratory, Air Force Flight Dynamics Laboratory and Air Force Avionics Laboratory. Results will be applied to the design of advanced systems such as the digital avionics information system (DAIS), helmet-mounted display (HMD) and the drone control facility (DCF). Requirements are identified in such documents as TPG RPV-RTA, AFAL ADP 665A and TPG IN- RTA.

Laboratory studies will be conducted to assess the impact of spatial, energy, spectral, and temporal parameters of displayed information on human visual perception. These studies will be utilized to evolve a human visual describing function which relates sensor/display subsystem performance to task performance by the operator. Performance assessment techniques will be developed to fractionate the perception of information into sensory and cognitive components. The visual demand requirements and visual information channel capacity of the operator will be established in terms appropriate for application to sensor/display subsystem design. The display parameters associated with various electro-optical and infrared imaging sensor/display systems will be simulated in the display laboratory to determine their effects on operator performance. Consultation and support will be provided to system development organizations regarding human factors design of sensor/display subsystems based on operator visual performance criteria. Some prior efforts in this area were reported under work unit 71841013, Human Visual Performance with Battlefield Illumination and Marking.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0017, CREW FACTORS FOR PERFORMANCE ENHANCEMENT IN COMBINED ENVIRONMENTAL STRESS
D.B. ROGERS, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319040)

To provide experimental scenarios and testing facilities for evaluation of prototype devices and procedures using man-in-the-loop techniques. The area provides for both SPO, other DOD lab joint efforts as well as internally initiated activities. Conceptual and breadboard systems for crew capability enhancement are included. Consultation is provided to outside organizations such as Life Support SPO, B-1 SPO, and AF Flight Dynamics Laboratory.

The effort uses the dynamic environment simulator (DES) and other AMRL/EM simulation facilities for man-in-the-loop simulation testing to provide realistic stress environments. Each request or technique in general requires a unique test mockup system to provide the appropriate system environment.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0018, EFFECTS OF AIR TEMPERATURE ON MISSION-RELATED PERFORMANCE

K.A. SMILES, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF318980)

To quantify changes in piloting and weapons delivery type skills as a function of ambient temperature. The results are to be used by ASD/ENJPC for optimizing manned weapons system performance via trade-off studies on the benefits of diverting airplane engine power to the environmental control system to enhance the pilot performance through optimum cockpit environmental temperature control.

Subjects are to be exposed to a range of ambient temperatures of varying durations while they perform compensatory tracking tasks which isolate critical phases of piloting and weapons delivery skills. The tracking records are analyzed via human operator parameter identification techniques. These parameters will describe the dynamic changes in man's control characteristics as a function of the stress. Physiological correlations to these parameter changes will be isolated during the experimental phase so that the resulting equations can be appropriately used in realistic combined environmental stress situations.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0019, INERTIAL/MECHANICAL EFFECTS ON PERFORMANCE

K.A. SMILES, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433 (DF319010)

To determine the effect of the mechanical force field of the acceleration environment on critical pilot control tasks. This is part of an experimental program designed to separate the mechanical and hypoxic components of acceleration induced performance changes so as to gain additive and predictive qualities in dynamic equations of man's control capabilities in combined stress environments. The effort supports development of the high acceleration cockpit (HAC), and control configured vehicle (CCV) programs.

Human subjects will be exposed to fairly low gz acceleration stresses of short duration while wearing g-suits and breathing 100 percent oxygen. During these experiments, the subjects will be performing several compensatory tracking tasks simulating extremes of airplane dynamics and a simulated gunnery task. The records will be analyzed by human operator parameter identification techniques and the results incorporated into systems effectiveness measures.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab EM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0020, ANTHROPOMETRIC CRITERIA FOR ENHANCING OPERATOR PERFORMANCE AND SAFETY

E. CHURCHILL, Webb Associates, *Yellow Springs, Ohio* 45387 (DF318270; F33615-75-C-5003)

To provide engineering anthropometric data required to guide the design of cockpit and other workplace geometries and the design and sizing of personal-protective equipment for Air Force personnel, and biomechanical data for enhancing their performance and safety in operational environments.

New sizing and shape criteria will be developed for helmet shells incorporating the foam-in-place suspension system. The adequacy of a new sizing system for face pieces will be tested in an OT&E of a new AF oxygen mask. Realistic sizing criteria will be developed for analogs of the human body used in testing man's reactions to hazardous environments. To form a basis for determining the relationships between body size and injuries incurred upon ejection, a simple photometric system will be tested to determine the accuracy with which limited anthropometric data of all who fly ejection-seat type aircraft can be obtained by nonprofessional anthropometrists. Dimensional differences between men and women of the Air Force will be summarized and their effects on systems and equipment design evaluated.

Supporting agency address information: 6570 Aerospace Medical Rsch Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0021, SENSATIONS OF MOVEMENT AND CHANGES OF PERCEIVED ATTITUDE IN DYNAMIC FLIGHT SIMULATION

R.J. CROSBIE, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974 (DN581102)

Determine thresholds and transfer functions that describe human sensory responses to the effect of linear and angular accelerations. To determine how linear and angular accelerations interact to produce sensations of movement and changes of perceived attitude such as those encountered in actual aircraft flight maneuvers. To employ the derived transfer functions as the basis for controlling the NavAirDevCen human centrifuge, enabling its extended application in research, development, evaluation, and training.

Threshold and transfer functions for human sensory responses to combined linear and angular accelerations will be determined and used as the basis for controlling NavAirDevCen human centrifuge as a dynamic flight simulator. Because dynamic flight simulators do not duplicate the precise accelerations and motions of the aircraft maneuvers being simulated, it is necessary to substitute other motions and accelerations in a manner that the simulator pilot is minimally aware of any substitution. For an adequate substitution of accelerations to be achieved, it is imperative to understand how various linear/angular accelerations are perceived by human observers and how they can be substituted for one another under a wide range of conditions. Proposed research will measure thresholds and transfer functions for human sensory responses to linear and angular accelerations, and will determine to what extent trade-offs can be made between linear/angular accelerations in dynamic flight simulation.

Supporting agency address information: Naval Air Development Center, Warminster, Pennsylvania 18974

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0022, PSYCHO-PHYSIOLOGICAL ASSESSMENT AND EVALUATION OF PROTECTIVE CREW EQUIPMENT DEVELOPMENT CRITERIA

V. VOGUE, U.S. Navy, Crew Systems Department, *Warminster, Pennsylvania* 18974 (DN581100)

Establish optimal physiological/biomedical specifications and criteria for design, development, and testing of protective crew equipment including escape systems, restraint systems, fixed seat systems, survival equipment, and personal protective equipment.

Existing data about adequacy and safety of protective equipment will be researched/complemented by in-house research. Aggressive review of all work units will be done. The department will establish, when applicable, need of continuous cooperative assistance of personnel of Life Sciences Div. to derive/establish biomedical specifications/criteria for design/development of new items of life support/protective equipment. When the equipment reaches testing stage, assistance for establishment of test protocol/safety procedures will be provided, including monitorship, pre- and post-run medical examination, medical evalution of test results and, if applicable, suggestions for subsequent improve-

ment of medical adequacy of systems. This plan of action will be applied, but not necessarily limited to, escape systems, including novel light-weight ejection seat systems with vertical sensing devices, g-protective positioning systems and their evaluation on human centrifuge, impact mitigating systems, the evaluation on the horizontal accelerator and drop tower, and environmental protective systems including survival equipment, and their evaluation in panclimatic chambers or in the natural environment.

Supporting agency address information: Commanding Officer, Naval Medical Research & Dvlpmnt (71), National Naval Medical Center, Bethesda, Maryland 20014

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0023, CREW RATIOS FOR MINUTEMAN AIR MOBILE MODES

R. GARCIA, U.S. Air Force, School of Aerospace Med., *San Antonio, Texas* 78235 (DF319290)

Various modes of operation are under consideration for air mobile employment of the Minuteman missile. In order to make effective cost- effectiveness analyses it is necessary to know what crew ratios will be required under each mode and various combinations of modes. This effort will provide supportable estimates of optimum aircrew manning under the various proposed modes of operation.

A computer simulation program, developed several years ago at USAFSAM, which focusses on the aircrew aspects of operations, will be adapted to the particular environment (resources, workload, system characteristics, crew work rules) being envisioned for the MX system. Simulations will be run under each proposed mode of operation to determine the minimum crew ratio required. Summary statistics of such runs will also provide planners a better feel for actual implications of each proposed mode as well as the sensitivity of the answers to such inputs as guaranteed aircraft uptime.

Supporting agency address information: USAF School of Aerospace Medicine BR, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0024, COMPARISON OF THEORETICAL AND EXPERIMENTAL ABSORPTION OF RADIOFREQUENCY POWER

C.H. DURNEY, Univ. of Utah, School of Engineering, *Salt Lake City, Utah* 84112 (DF318700; F41609-75-C-0022)

Recent data indicate that the biological hazard of nonionizing electromagnetic radiation is frequency dependent and body shape, size, and orientation are important variables affecting power deposition and subsequent hazard. The USAF is advocating a frequency-related safety standard approach and the objective of this study is to extend theoretical radiofrequency (RF) power absorption calculations and to perform experimental measurements which are necessary for assessing realistic personnel exposure criteria in the 10 kHz to 100 mHz frequency range. Assessment techniques will account for size and orientation effects, to extrapolate from animal to human RF exposure situations.

A set of prolate spheroid models will be constructed to represent the rhesus primate and human. Theoretical calculations will be made to determine the amount of power absorbed for exposures between 10 kHz and 100 mHz. Power absorption measurements will be performed from 10-30 mHz and the results compared with theory. Rhesus primates will be exposed in the same geometry as the phantoms to evaluate anisotropic effects. The resulting data will be used to establish appropriate personnel exposure guidelines for a broader frequency range than can be measured with available experimental apparatus.

Supporting agency address information: USAF School of Aerospace Medicine RA, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0025, AIRCRAFT RECOGNITION-ACQUISITION AND RETENTION

R.D. BALDWIN, Human Resources Research Org., *Alexandria, Virginia* 22314 (DA644096; DAHC19-75-C-0020)

The overall effectiveness of man-ascendant weapon systems, i.e., Vulcan, Chaparral, and Red-eye, is dependent on the air defender's ability to identify hostile low-altitude, high-performance aircraft early enough to be able to take necessary action to effectively engage the target before it is able to neutralize friendly assets. The objective of the present project is to determine the validity of present methods of aircraft recognition training and to assess the maximum number of aircraft which the air defender can effectively remember (saturation limit). Results will include recommendations concerning present training methods and benefit of innovative training techniques.

Two experiments will be conducted. In the first experiment, one group of air defenders will be trained in aircraft recognition using the GOAR (ground observer aircraft recognition) kit (training images presented via 35mm slides). The second group will be trained using printed images. Each training method will be compared and validated by correlating training scores with recognition accuracy as measured by moving, small-scale model aircraft. In the second experiment, aircraft acquisition and retention will be measured as a function of number of aircraft to be learned to determine the saturation point for aircraft recognition.

Supporting agency address information: DA Army Research Institute, Ft. Bliss Field Unit, Ft. Bliss, Tx. 79916

SUPPORTED BY U.S. Dept. of Defense - Army

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, ESTIMATION AND IDENTIFICATION FOR MODELING DYNAMIC SYSTEMS

J.M. MENDEL, Univ. of Southern California, Graduate School, *Los Angeles, California* 90007 (DF040480; AF-AFOSR-2797-75)

The precision to which Air Force systems such as aircraft, jet engines, missiles, etc., are controlled is limited by how well the designer understands their dynamics. For example, uncertainty in predicting the response of a turbine engine to variations in inlet area, rotor van angle, or fuel flow restricts the control designer's ability to make the engine respond at the upper limits of its potential, lest the uncertain variations in dynamics result in shortened engine life or even catastrophic failure. To overcome this problem better methods are needed for understanding and predicting system response. This research program addresses this problem in two aspects, multistage estimation and identification algorithms for dynamical systems and parametric identification algorithms for estimation of input/output response. The first area is concerned with developing estimation algorithms both for parameter and state estimation that are recursive in the dimension of the parameter vector or state vector. At present if the designer wishes to increase or decrease the order of the system model he must resolve the entire identification problem. The multistage algorithms will allow the designer to make decisions about the relative importance of different effects and parametric systematic manner. Recursive algorithms allowing this do not presently exist. The second area deals directly with identifying a linear system's input/output response, rather than its parametric representation. This research is motivated by the fact that identified models often give very poor estimates of system response. Existing identification algorithms will be analyzed and modified to better reproduce system input/output response. Then both the deterministic and stochastic optimal input design problems will be studied.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0002, STRUCTURAL RESPONSE OF BONDED MULTILAYER SHELLS

E.A. WITMER, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (DA0L4562; DAAD05-75-C-0721)

To complete the development of a computer program (designated Petros 4) for predicting transient elastoplastic, large deflection responses of multilayer soft-bonded shell structures to prescribed loads. This analytical tool will be useful for survivability analyses of aircraft and interceptor missiles and for lethality predictions concerning re-entry vehicles.

The existing version of the Petros 4 code, which was developed under an earlier contract with the same contractor, will be modified regarding computational efficiency and input/output features. The code will then be exercised on a variety of problems to check plausibility and accuracy of solutions, which will also be compared with experimental data where available. Results will be documented in a user's manual.

Supporting agency address information: AMC Ballistic Research Lab, Aberdeen PG, Md. 21005

SUPPORTED BY U.S. Dept. of Defense - Army

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, MICROWAVE PHYSICS MATH
UNKNOWN, R D P Incorporated, *Bedford, Massachusetts* 01713 (DF243010; F19628-75-C-0119)

AF function - target detection in clutter, missile re-entry communications, electronic countermeasures. AWACS and advanced airborne national command post. Deficiency - electromagnetic scattering screens radar targets. Plasma sheath reflects RF signals in re-entry vehicles. ICBM and ITBMS are vulnerable to ABM interceptors. AWACS and AABNCP communications can be interrupted by jamming signals. Objective - methods of target detection in clutter and methods of radar cross section control. Characterization of plasma sheath and effects of chemical additives. Developemnt of contiguous wideband frequency analyzers for threat signal acquisition. Design of frequency agile anti- jam system. How research contributes - establishes target scatter characteristics with and without clutter present and contributes to the design of ABM penetration aids.

Evaluation and reduction of data derived from measurements of mathematical models will aid in the solution of problems. The completed work is in the form of graphs, curves, tabulations or equations, suitable for computer processing. These results will be incorporated in the overall research effort of the laboratory in above mentioned problem areas.

Supporting agency address information: AF Cambridge Research Laboratories LZ, L. G. Hanscom AFB, Bedford, Mass. 01730

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0002, ION IMPLANTATION IN III-V COMPOUNDS
Y.S. PARK, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio* (DF214830)

AF function - avionics, communications, microwave generation and detection. Deficiency - Air Force avionics systems require basic electronic components employing semiconductors such as GaAs and other III-V compounds. Characteristics of ion-implanted III-V compounds are not well understood. Research - ion-implantation of III-V compound semiconductors with the dopants which will alter electrical and optical characteristics of the materials. Study of the dopant profiles, damage profiles, atomic positions of the implanted dopants, surface contamination, interface conditions and annealing conditions. Identification of defects in As-grown crystals. Applications of ion- implantation techniques to fabrication of waveguides, microwave devices and for electrical isolation of device structures. How research contributes - a deeper understanding of the results of ion-implantation will provide a technology to improve the performance and operating characteristics of solid-state devices of III-V compounds. Will provide better characterization and control of the intrinsic lattice defects introduced into the starting materials during crystal growth and subsequent device processing steps.

Selected group III-V compound semiconductors in bulk-or-epitaxial configurations will be ion-implanted or electron-bombarded. To characterize the implanted- or electron-irradiated crystals, measurements of luminescence, electrical conductivity, Hall effect, photoconductivity, reflectivity and absorption are used. EPR, NMR and ENDOR are used to study the type of radiation damage centers created by ion-implantation and electron bombardment. Ion-channeling, auger- electron spectroscopy, C-V measurements, electron emission spectrometry and Raman scattering are used to learn the depth profile and location of the implanted atoms.

Supporting agency address information: Aerospace Research Laboratory LS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, THE HERITAGE OF AVIATION MEDICINE
R.J. BENFORD, Aerospace Medical Association, *Washington, District of Columbia* 20001 (LM 02656-01)

Objectives: This project proposes the preparation of a manuscript for a catalog/directory affording direct access to the identification and location of significant aviation medical memorabilia, artifacts and relics now preserved in museums, archives, libraries and private collections. Published material, except for rare items, would be excluded. There is no known similar reference work.

Methods: Queries of solicitation for information desired would be directed to selected curators, archivists and librarians, to historians of medical and aviation societies, and to private collectors. Additional input may follow (1) a suggested announcement in newsletters, bulletins and other publications of these organizations, and (2) wide distribution of a news release, possibly by the Aerospace Medical Association, to the medical and aviation press. The aim is to uncover material held by individuals (often their own equipment or keepsakes) so that through correspondence additional items might be identified--like a chain letter. Because printed catalogs of museums are rarely available, visits will be made to the largest aviation medical and aerospace collections and exhibits. Searches for foreign material, probably limited to Canada, England, France, and Germany, would be initiated by queries to the senior Air Force Medical Officer, airline Medical Director, and civil Air Surgeon of each country. A system of filing and indexing data will permit continuous compilation of information up to an established deadline. The planned manuscript, organized by subjects, will include, for specific material, appropriate description, historical comment, essential illustrations, ownership credit, and availability for loan.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.H.

9.0002, NBS SUPPORT FOR TRANSPORTATION EVALUATION, IMPACT MEASURE DEVELOPMENT, EXPERIMENT DESIGN AND NEW SUBMITTAL AND REVIEW OF ANALYTICAL SUPPORT
UNKNOWN, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Gaithersburg, Maryland* 20760 (025251 (HRB NO.))

The project involves: (a) assistance in Dulles TRANSPO Bus and Rail evaluation, (b) development of UMTA impact measure of mobility, (c) experimental design theory improvement, (d) support analysis of unsolicited proposals and draft final reports received by UMTA, and (e) transit attitude research leading to improved transit acceptance.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY U.S. Dept. of Transportation - U.M.T.A.

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, MAGNETOSPHERIC MAGNETIC FIELD MODELING

W.P. OLSON, McDonnell Douglas Astron. Co., *Huntington Beach, California* 92647 (DF040430; F44620-75-C-0033)

This research is directly related to the Air Force functions of detection, tracking, and communications. The influence of the solar wind on the magnetosphere and atmosphere will be studied. An improved quantitative model of the magnetopause that includes the recently observed feature of solar wind entry through the 'dayside (or polar) cusps' will be developed and used to quantitatively study the effects of this plasma on the neutral atmosphere and several magnetospheric phenomena. A model of upper atmospheric density will be developed which include the effects of corpuscular heating for the first time. In order to verify the results of these studies and to determine how to better monitor the behavior of the solar wind, the variations in the observed properties of the solar wind will be directly correlated with observed changes in atmospheric and magnetospheric processes. The proposed research is an important initial step in the effort to quantitatively understand the aerospace environment, and predict its effects on satellite and missile trajectories, and radio communications.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

10.0002, RADIO DIAGNOSTIC STUDIES OF THE EARTH'S PLASMA ENVIRONMENT

V.H. RUMSEY, Univ. of California, School of Engineering, *San Diego, California* 92038 (DES75-13451)

An observatory which uses interplanetary scintillations, IPS, to make daily measurements of the solar wind speed, direction, and the spectrum of electron density has been set up under previous NSF grants. These observations cover latitudes from minus 60 degrees to plus 80 degrees and radial distances from 70 RO to 280 RO. By using several different radio sources, many different regions are probed simultaneously. They have also used high-frequency IPS at other observatories and so extended the range of coverage in to about 1 R0 from the photosphere.

The regular observations will be continued. They will be used to study the structure and evolution of co-rotating streams and transients; to relate these structures to photospheric structures; and to study the long period variations of the 'average' properties of the solar wind. The detailed structure of co-rotating streams will be examined by comparison of data with simultaneous IMP 7 and 8 plasma data. Use will be made of the latitude range of the data to examine the difficult question of what physical structures in the corona give rise to the streams. From IPS observations close to the sun, they will be able to investigate the solar wind in the critical region from a few to perhaps 70 solar radii.

SUPPORTED BY U.S. Natl. Science Foundation

10.0003, PHOTOGEOLOGY FROM APOLLO 15-17 (NASA EXPERIMENT S-222)

F. ELBAZ, Smithsonian Institution, *Washington, District of Columbia* 20560 (174020; 14-08-0001-13689)

Continuation of lunar research efforts and geological mapping based on the photographic data provided mostly from lunar orbit on Apollo missions 15, 16 and 17.

The primary role of the Principal Investigator is the correlation of Apollo orbital geochemistry data with photogeologic interpretation. In addition to this the Principal Investigator also has the lead role in geologic investigations of topical lunar problems including the study of King Crater, the Harbinger Mountains, and the D-Caldera structure.

The Principal Investigator is also responsible for the publication of the results of the research in form of books, papers, maps and pamphlets; or oral presentation of the results at scientific meetings, seminars and conferences.

SUPPORTED BY U.S. Dept. of Interior - Geological Survey

10.0004, SPECTRA AND IONIZATION OF FAINT METEORS

C.L. HEMENWAY, Dudley Observatory, *Albany, New York* 12208 (MPS72-00321 A01)

Support is for an additional year of the co-operative program to observe, analyze and interpret the spectra of faint meteors with high sensitivity television technique. Meteor spectra 5 magnitudes fainter than traditional photographic techniques are recorded, principally at the Springhill Meteor Observatory, Ontario, Canada. Calibration of these T.V. techniques will be made by simultaneous observation of bright meteors with photographic cameras and meteor spectrographs and by T.V. observation of stellar spectra. Trajectory data for faint meteors are obtained from the meteor observers and the meteor radars at Springhill. Time dependence of the development and decay of individual features in meteor spectra will be studied. Using recently determined luminous efficiencies, relative chemical compositions of meteoric materials will be determined.

Prior support was by NSF grant GP-42997.

SUPPORTED BY U.S. Natl. Science Foundation

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N75-29996* + National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 58
Jun. 1975 141 p refs
(NASA-SP-7037(58)) Avail: NTIS HC $4.00 CSCL 01A

This bibliography lists 484 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1975. Author

N75-29997# Advisory Group for Aerospace Research and Development, Paris (France).
METHODS FOR AIRCRAFT STATE AND PARAMETER IDENTIFICATION
May 1975 440 p refs Meeting held at Hampton, Va., 5-8 Nov. 1974
(AGARD-CR-172) Avail: NTIS HC $11.25

Papers which discuss and compare results obtained with different parameter identification techniques applied to specific fighter aircraft at high angles of attack, subsonic, and supersonic transports, VTOL and STOL aircraft, and helicopters are presented. Special problems areas such as systems modeling with high internally generated fluctuations, aircraft state estimation in nonsteady flight, and parameter identification for nonlinear aerodynamic regimes are covered. For individual titles, see N75-29998 through N75-30026.

N75-29998 Royal Aircraft Establishment, Bedford (England).
MODELLING OF SYSTEMS WITH A HIGH LEVEL OF INTERNAL FLUCTUATIONS **c05**
J. G. Jones *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs (For availability see N75-29997 21-01)

The problem of modelling the structure of systems with a high level of internally generated fluctuations is discussed and problems in parameter identification are reviewed. The systems considered typically have two types of behavior, determined by the magnitude of a controlling parameter which influences stability. For a finite range of parameter values the system is stable and its structure may be described by a deterministic set of differential equations. If not subjected to external disturbances the system will achieve a state of equilibrium. At some 'critical' value of the parameter, however, the system becomes unstable and beyond this boundary the system no longer achieves a state of equilibrium but may exist (as a result of nonlinearities) in a steady state typified by continuous fluctuations. This state may either be described as a regular limit-cycle type of oscillation or may be essentially random in nature. Practical examples include aircraft buffeting and wing-rocking, forms of fluctuating motion which occur respectively in structural and rigid-body modes. In these examples aircraft incidence may be regarded as the controlling parameter and the fluctuating motion is associated with the existence of extensive areas of separated flow at high incidence. A structure which falls into the type considered, is the standard human-pilot model in which the internal fluctuations are represented by a 'remnant'. An example is discussed which illustrates problems that can arise in the identification of this type of system when operating as part of a closed loop. Author

N75-29999 Calspan Corp., Buffalo, N.Y.
IDENTIFICATION OF NONLINEAR AERODYNAMIC STABILITY AND CONTROL PARAMETERS AT HIGH ANGLE OF ATTACK **c08**
B. J. Eulrich and E. G. Rynaski *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
(Contract F33615-72-C-1248)

A procedure is described for the estimation of the nonlinear aerodynamic stability and control coefficients at high aircraft angles of attack. It is based on a nonlinear, iterated Kalman filter/fixed-point smoother identification algorithm and a least squares equation error method. Key ingredients for successful identification are the mathematical model, instrumentation system, control inputs, and the identification algorithm. The major emphasis is placed on the use of the identification procedure in analyzing high angle of attack flight data. Specifically, model form and initial estimates are established from wind tunnel data using series expansions to represent the nondimensional force and moment coefficients for selected ranges of angle of attack. This high dimensional representation is reduced by: (1) preprocessing the flight data using the instrumentation system model and the six-degree-of-freedom aircraft kinematic equations to perform optimal state estimation and hence decrease the effects of instrumentation errors; and (2) separating the six equations of motion into two separate four-degree-of-freedom systems; one for extracting the longitudinal coefficients and the other for the lateral-directional coefficients. Specific problems associated with the identification procedure at high angles of attack and parameter identifiability problems caused by poorly conditioned flight data are reviewed. Selection of the coordinate system for the aircraft model, the determination of the initial covariance estimates, and the measurement and process noise statistics required to use the iterated Kalman technique are discussed. Author

N75-30000 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
METHODS USED FOR OPTIMIZING THE SIMULATION OF CONCORDE SST USING FLIGHT TEST RESULTS **c09**
Jacques Tardy *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p (For availability see N75-29997 21-01)

The elaborate calculation means provided by a simulator were used in the design of CONCORDE. Different simulators of more and more sophisticated design, were installed from a fixed base analog simulator to the present simulator which is described. This simulator is used for various design purposes: development studies for the aircraft and its systems: handling qualities, flying controls, various piloting aids, failure research; flight test preparation and crew training; crew work load studies; studies for introducing CONCORDE into air traffic in liaison with EUROCONTROL; and preparation for aircraft certification,

examination of requirements and participation in certification for the most critical conditions to be tested in flight, testing very low probability failures or investigations in the extreme regulatory atmospheric conditions. Author

N75-30001* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPLICATION OF A NEW CRITERION FOR MODELING SYSTEMS c66
Lawrence W. Taylor, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 9 p refs (For availability see N75-29997 21-01)
CSCL 12B

A new criterion is proposed for modeling systems which promises to be useful in deciding how complex a model should be. The criterion is based on the expected model response error instead of the error in fitting the data used for estimating the model parameters. The new criterion also does not require withholding data to be used exclusively for testing. There remains, however, the difficulty of testing a large number of candidate models that correspond to the combinations of terms used in the dynamic equations. A computational approach is suggested which greatly reduces the computations required in searching for the best model. In the suggested approach the gradient of the response with respect to the model coefficients is held fixed and numerous combinations of terms are assessed. After determining the most promising candidate model, the gradient is updated and the process is repeated. This procedure gives greater assurance that the best model is selected and does not rely on the analyst's judgement. Author

N75-30002* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A MONTE CARLO ANALYSIS OF THE EFFECTS OF INSTRUMENTATION ERRORS ON AIRCRAFT PARAMETER IDENTIFICATION c08
Wayne H. Bryant and Ward F. Hodge *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 19 p refs (For availability see N75-29997 21-01)
CSCL 01C

An output error estimation algorithm was used to evaluate the effects of both static and dynamic instrumentation errors on the estimation of aircraft stability and control parameters. A Monte Carlo analysis, using simulated cruise flight data, was performed for a high performance military aircraft, a large commercial transport, and a small general-aviation aircraft. The effects of variations in the information content of the flight data, resulting from two different choices of control input maneuvers, were also determined. The results indicate that unmodeled instrumentation errors can cause inaccuracies in the estimated parameters which are comparable to their nominal values. Control input errors and angular accelerometer lags were found to be most significant of the instrumentation errors evaluated, and the perturbations they produce are much larger than those arising from the combined effects of static errors and white noise in the output response measurements. Author

N75-30003 Technische Hogeschool, Delft (Netherlands).
ADVANCED FLIGHT TEST INSTRUMENTATION: DESIGN AND CALIBRATION c06
R. J. A. W. Hosman *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 17 p refs (For availability see N75-29997 21-01)

A series of flight tests with a Hawker Hunter Mk.7 aircraft was performed to determine the performance as well as stability and control characteristics. The instrumentation system used in these tests is described. Major topics discussed include: the choice of the specifications for the transducers as related to the desired accuracy of the characteristics of the aircraft to be determined; the methods applied to meet these specifications, especially for the pressure transducers; the calibration program to determine the characteristics of the transducers in the statistical format, and to apply modern system theory to the analysis of the flight measurements. Author

N75-30004* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A COMPLEMENTARY FILTERING TECHNIQUE FOR DERIVING AIRCRAFT VELOCITY AND POSITION INFORMATION c06
Frank R. Niessen *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 16 p refs (For availability see N75-29997 21-01)
CSCL 01C

An onboard navigation system which employed complementary filtering was developed to provide velocity and position information. The inputs to the mix filter included both acceleration inputs, which provided high-frequency position and velocity information, and radar position inputs, which provided the low-frequency position and velocity information. Onboard aircraft instrumentation, including attitude reference gyros and body-mounted accelerometers, was used to provide the acceleration information. An in-flight comparison of signal quality and accuracy showed good agreement between the complementary filtering system and an aided inertial navigation system. Furthermore, the complementary filtering system was proven to be satisfactory in control and display system applications for both automatic and pilot-in-the-loop instrument approaches and landings. Author

N75-30005 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
SENSORS AND FILTERING TECHNIQUES FOR FLIGHT TESTING THE VAK 191 AND VFW 614 AIRCRAFT c06
Werner E. Seibold *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 14 p (For availability see N75-29997 21-01)

The flow of the flight test data of the VFW 614 (VAK 191B) Aircraft from the sensor through the data acquisition, selection, and preprocessing process is described. An overview of the sensors included in the VFW 614 is given. Two important sensors for takeoff and landing performance are described. The data smoothing and filtering techniques are discussed. Special emphasis is given to a powerful digital filter, the Si or Riedel filter. Author

N75-30006 National Aerospace Lab., Amsterdam (Netherlands).
DESIGN AND EVALUATION OF A SYMMETRIC FLIGHT-TEST MANOEUVRE FOR THE ESTIMATION OF LONGITUDINAL PERFORMANCE AND STABILITY AND CONTROL CHARACTERISTICS c08
H. W. Kleingeld *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 6 p refs (For availability see N75-29997 21-01)

Longitudinal performance and stability and control data are derived from measurements in one flight test maneuver. The maneuver is comprised of quasi-steady accelerating parts and nonsteady oscillating parts. A moving base simulator is used to determine the problems which accompany the manual application of the required elevator control input and to teach the pilot to generate the signal without feedback. Results of this evaluation program are given and compared with corresponding results of the actual flight tests. Author

N75-30007 Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF STABILITY DERIVATIVES FROM FLIGHT TEST RESULTS COMPARISON OF FIVE ANALYTICAL TECHNIQUES c08
Horst Wuennenberg, Heinz Friedrich, Ulrich VonMeier, and Hans-Joachim Munser *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 12 p refs (For availability see N75-29997 21-01)

Analytical techniques in stability derivatives estimation are compared. The test aircraft, a G 91-T3, was equipped with a sophisticated instrumentation and data acquisition system. The analytical techniques: manual evaluation of special flight maneuvers, time vector method, forced oscillation method, analog matching, and regression analysis are compared in relation to the amount of time and equipment for the flight testing, complication of the data reduction, and the quality of the results. The accuracy of the data acquisition is the most important problem. Therefore an accurate check of all test data has to be performed before sophisticated evaluation programs are used. It is summarized that several measuring and evaluation techniques should be used in parallel. Author

N75-30008 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FIVE IDENTIFICATION METHODS APPLIED TO FLIGHT TEST DATA c05
Jean-Pierre Chaquin *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p refs (For availability see N75-29997 21-01)

The parameter of linear multivariable systems using input and output measurements is determined. It is assumed that the physical system, which is to be investigated, can be described by a set of linear differential equations with constant coefficients. These estimations are to be applied to the derivation of active control parameters. Tests of well known methods, such as least squares, modulating functions, conjugate gradients and analog matching, are developed. Some results are proposed to be used as support for the comparison of the comparison of the different methods. Author

N75-30009* Harvard Univ., Cambridge, Mass.
STATUS OF INPUT DESIGN FOR AIRCRAFT PARAMETER IDENTIFICATION c08
R. K. Mehra and N. K. Eupta (Systems Control, Inc.) *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01)
(Contracts NAS4-2068; N00014-67-A-0298-0006)
CSCL 01C

Results are presented on the design of aircraft inputs (i.e. elevator, rudder and aeleron deflection time histories) to identify aircraft stability and control derivatives from flight test data. The problem is first reduced to an optimization problem with differential and integral constraints. The criteria used are either expressed in terms of the Cramer-Rao lower bound on the covariance matrix of the parameter estimates or in terms of the maximum prediction error variance. Both time-domain longitudinal and lateral dynamics of C-8 and Jet Star aircrafts and comparison with doublet type inputs are made. Author

N75-30010 Calspan Corp., Buffalo, N.Y. Flight Research Dept.
INPUT DESIGN FOR AIRCRAFT PARAMETER IDENTIFICATION: USING TIME-OPTIMAL CONTROL FORMULATION c08
Robert T. N. Chen *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
(Contract N00019-73-C-0504)

A new formulation and a practical and useful solution to the input design for identification of aircraft stability and control parameters is presented. Necessary conditions and the structure of the optimal control input are discussed. By using Walsh functions and calculating the Cramer-Rao lower bounds recursively, a practical and useful design procedure is then presented. Application of the new approach are then made to the design of flight test inputs for identification of stability and control parameters of several types of aircraft. Author

N75-30011 Royal Aircraft Establishment, Farnborough (England).
DETERMINATION OF AERODYNAMIC DERIVATIVES FROM TRANSIENT RESPONSES IN MANOEUVRING FLIGHT c05
A. Jean Ross *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)

Computer programs using optimization techniques to obtain aerodynamic derivatives from flight records are briefly described. Results pertaining to aircraft flying at high angles of attack are presented. J.M.S.

N75-30012 Naval Air Test Center, Patuxent River, Md. Flight Test Div.
ADVANCEMENT IN PARAMENTER IDENTIFICATION AND AIRCRAFT FLIGHT TESTING c08
Roger A. Burton *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 16 p refs (For availability see N75-29997 21-01)

Results are presented from a program to develop parameter identification technology with specific emphasis placed on studies conducted in parameter identifiability and (optimal) control inputs for parameter estimation. Navy applications for parameter identification technology are discussed with specific areas in aircraft stability and control testing outlined. Specific criteria required for defining optimal control inputs and establishing parameter identifiability are discussed. Parameter identification results from the analysis of flight test data are presented which establish the need for considering input design in planning tests for extracting aerodynamic coefficients from flight test data. Parameter identifiability results for specific control inputs used are presented. In cases where identifiability problems are shown to exist the use of a rank deficient solution to improve parameter identifiability is demonstrated. Author

N75-30013* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
PRACTICAL ASPECTS OF USING A MAXIMUM LIKELIHOOD ESTIMATOR c08
Kenneth W. Iliff and Richard E. Maine *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
CSCL 01C

The application of a maximum likelihood estimator to flight data is discussed and procedures to facilitate routine analysis of a large amount of flight data are proposed. Flight data were used to demonstrate the proposed procedures. Modeling considerations are discussed for the system to be identified, including linear aerodynamics, instrumentation, and data time shifts, and aerodynamic biases for the specific types of maneuvers to be analyzed. Data editing to eliminate common data acquisition problems, and a method of identifying other problems are considered. The need for careful selection of the maneuver or portions of the maneuver to be analyzed is pointed out. Uncertaintly levels (analogous to Cramer-Rao bounds) are discussed as a way of recognizing significant new information. Author

N75-30014 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
DETERMINATION OF AIRCRAFT DERIVATIVES BY AUTOMATIC PARAMETER ADJUSTMENT AND FREQUENCY RESPONSE METHODS c08
M. Marchand and R. Koehler *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs (For availability see N75-29997 21-01)

Experiences are reviewed in the estimation of aircraft parameters by means of three identification methods: frequency response, maximum-likelihood, and model with automatic parameter adjustment. Results using flight test data from the Do-27 and HFB-320 aircraft are presented. The effects of including nonlinear terms and turbulence in the model are also discussed. The model with the automatic parameter adjustment method was used for studying the problems of derivative identification for rotorcraft type vehicles. Preliminary results obtained when evaluating simulated Sikorsky S-61 flight data with various input signals are given. Some aspects of designing input signals for flight tests are discussed, system parameters and are easily flown by the pilot. Author

N75-30015 Air Force Flight Test Center, Edwards AFB, Calif.
A COMPARISON AND EVALUATION OF TWO METHODS OF EXTRACTING STABILITY DERIVATIVES FROM FLIGHT TEST DATA c05
Paul W. Kirsten *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 26 p refs (For availability see N75-29997 21-01)

Two methods for extracting stability derivatives from flight data are compared. A modified Newton-Raphson minimization technique and a digital-analog (hybrid) matching technique were used to analyze the same data maneuvers obtained from two aircraft. About 55 maneuvers of an F-111E aircraft were analyzed over a Mach 0.3 to 2.0 and an angle of attack range of 3 to 19 degrees. About 15 maneuvers were analyzed for the X-24A lifting body at Mach numbers of 0.8 and 0.9 and an angle of attack range of 4 to 13 degrees. Stability derivatives were extracted from these maneuvers, and the results from the two techniques along with wind tunnel results were compared. The hybrid matching mathematical model contained complete

five-degree-of-freedom equations (no velocity derivatives) with variable dynamic pressure, whereas the Newton-Raphson model used uncoupled, three-degree-of-freedom equations with constant dynamic pressure. Both techniques were found to be capable of giving accurate results, but required a fairly extensive knowledge of the method being used. The Newton-Raphson technique tends to be less time consuming, and is suited for processing large quantities of data maneuvers. Hybrid matching is well suited for programs in which a limited amount of data is processed for each flight. Author

N75-30016 Technische Hogeschool, Delft (Netherlands).
ESTIMATION OF THE AIRCRAFT STATE IN NON-STEADY FLIGHT c05
J. A. Mulder *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01)

Kalman filtering and smoothing and maximum likelihood estimation techniques were applied to the problem of estimating the aircraft state in nonsteady flight from onboard noisy inertial and barometric measurements. Applied to actual flight test data, the estimation schemes yielded similar results. Author

N75-30017 Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF STABILITY DERIVATIVES FROM FLIGHT TEST RESULTS BY MEANS OF THE REGRESSION ANALYSIS c08
Heniz Friedrich *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p refs (For availability see N75-29997 21-01)

Some fundamental remarks about regression analysis are made, the method is described, and some test results with simulated data are given. The experiences with regression analysis gained from flight tests with the aircrafts Dornier Do 31 and Fiat G91-T3 are discussed in detail. The possibilities of the method were studied, and improvements by using a Kalman filter are considered. For each equation of motion, an example is represented. Author

N75-30018 Systems Control, Inc., Palo Alto, Calif.
MODEL STRUCTURE DETERMINATION AND PARAMETER IDENTIFICATION FOR NONLINEAR AERODYNAMIC FLIGHT REGIMES c05
W. Earl Hall, Jr., Narendra K. Gupta, and James S. Tyler, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01) (Contract N00014-72-C-0328)

The identification of nonlinear stall/spin regime air dynamic forces and moments is discussed, along with applications to simulated and flight test response data. For this development, a two-step method is presented. The first step is the application of an algorithm which determines the order and coefficients of polynomial expansions which determines the order and coefficients of polynomial expansions which determines the order and coefficients of polynomial expansions of the nonlinear aerodynamic forces and moments which characterize the stall/post-stall flight regime. The second step is the use of a nonlinear six degree-of freedom maximum likelihood algorithm which accurately estimates the values of the polynomial coefficients. This method was applied to simulated and flight test data for a twin engine swept wing fighter aircraft. Suggested approaches to general nonlinear flight regime identification are given. Author

N75-30019* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
IMPORTANCE OF HELICOPTER DYNAMICS TO THE MATHEMATICAL MODEL OF THE HELICOPTER c05
William F. White, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 12 p refs Prepared by Army Air Mobility Res. and Develop. Lab., Hampton, Va. (For availability see N75-29997 21-01)
CSCL 01C

A mathematical model of the helicopter requires appropriate representation of the constituent elements of rotor dynamics. General-purpose programs that model a variety of configurations for a broad range of operating conditions result in varying and incompatible levels of sophistication. Analysis of specific dynamic problems facilitates the identification of configuration parameters which determine system behavior. For the present analysis, the nonlinear equations of a torsionally rigid hingeless rotor are linearized about an equilibrium condition to determine flap-lag stability characteristics in hover. A collocation method was used to obtain the coupled natural frequencies and modes. These modes allow exact treatment of the effect of elastic coupling which more than compensates for the destabilizing inertial coupling. The sensitivity of damping to the number of modes was found to be small, and reasonable accuracy was obtained the first flapwise and edgewise coupled modes. The range of destabilizing precone was found to be small. Author

N75-30020 National Aeronautical Establishment, Ottawa (Ontario). Flight Research Lab.
ESTIMATES OF THE STABILITY DERIVATIVES OF A HELICOPTER AND A V/STOL AIRCRAFT FROM FLIGHT DATA c08
D. G. Grould and W. S. Hindson *In* AGARD Method for Aircraft State and Parameter Identification Jul. 1957 9 p refs (For availability see N75-29997 21-01)

Stability derivatives for the Bell 205 helicopter were derived from flight data using a least squares quasi-linearization technique. The aircraft model, which included a first order representation of rotor response characteristics, was based on fundamental parameters descriptive of the particular design. A conglomerate analysis procedure estimates based on data from several similar maneuvers was used to increase the confidence in the results observed. Data from CL-84 V/STOL aircraft were also analyzed, indicating the validity of certain a priori longitudinal stability derivatives for the aircraft, and yielding estimates of others. The results indicate the need to use a more elaborate modeling technique, (such as was used for the Bell 205) which takes into account the particular complexities of the aircraft. Author

N75-30021* United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
ROTORCRAFT DERIVATIVE IDENTIFICATION FROM ANALYTICAL MODELS AND FLIGHT TEST DATA c05
John A. Molusis *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 31 p refs Sponsored in part by NASA and USAAMRDL (For availability see N75-29997 21-01)
CSCL 01C

A general procedure is presented for systematic development of rotorcraft models for use in systems identification, which includes fuselage and rotor degrees of freedom (DOF). Formulations for rigid blade flap and lag as well as the normal mode representation of an elastic blade are developed for hingeless and articulated rotor systems. The method of multiblade coordinates is used to obtain linear constant coefficient state variable models of various levels of approximation. Two of the approximate models, a 6 DOF, are identified from a nonlinear articulated helicopter computer simulation. The results demonstrate the accuracy attainable for each model. Advanced results outline the status of rotorcraft modeling and systems identification and indicate areas that require further investigation. Author

N75-30022* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ROTOR SYSTEMS RESEARCH AIRCRAFT (RSRA) REQUIREMENTS FOR, AND CONTRIBUTIONS TO, ROTORCRAFT STATE ESTIMATION AND PARAMETER IDENTIFICATION c08
Gregory W. Condon *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs Prepared by Army Air Mobility Res. and Develop. Lab., Hampton, Va. (For availability see N75-29997 21-01)
CSCL 01C

Rotor System Research Aircraft (RSRA) is designed to provide the capabilities necessary for the effective and efficient in-flight test and verification of promising rotor concepts and supporting technology developments. The RSRA requirements for, and possible contributions to, rotorcraft state estimation and parameter identification technology are discussed. Author

N75-30023 Bell Helicopter Co., Fort Worth, Tex.
COMMENTS ON COMPUTATION OF AIRCRAFT FLIGHT

CHARACTERISTICS c05

C. L. Livingston *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p (For availability see N75-29997 21-01)

A digital computer program (C81) used to compute performance, dynamics, and loads of a wide variety of aircraft is described. Some of the configurations which have been simulated on C81 are depicted. Author

N75-30024 Calspan Corp., Buffalo, N.Y. Flight Research Dept.

THE EFFICIENT APPLICATION OF DIGITAL IDENTIFICATION TECHNIQUES TO FLIGHT DATA FROM A VARIABLE STABILITY V/STOL AIRCRAFT c05

J. Victor Lebacqz *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 13 p refs (For availability see N75-29997 21-01)

(Contracts N00019-69-C-0534; N00019-72-C-0044; N00019-72-C-0417; N00019-73-C-0504)

A prerequisite in the use of response-feedback variable stability aircraft to obtain flying qualities data is an accurate method for estimating stability and control parameters from flight data. It is necessary, however, that such methods be efficient and cost effective to minimize the effort and expense spent performing the estimation. The application of a digital identification technique X-22A V/STOL research aircraft is discussed. Emphasis is placed on practical aspects of identifying efficiently data covering a wide range of dynamic characteristics; particular attention is paid to the elimination of adjustments in the technique for each data run and the use of particular pilot control inputs to maximize identifiability. Results are presented for a variety of simulated dynamics. Author

N75-30025* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PARAMETER ESTIMATION OF POWERED-LIFT STOL AIRCRAFT CHARACTERISTICS INCLUDING TURBULENCE AND GROUND EFFECTS c05

Rodney C. Wingrove *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)

CSCL 01C

Longitudinal aerodynamic coefficients are estimated from data recorded during flight tests of a powered-lift STOL aircraft. A comparison is made between the coefficient values determined by the regression and quasilinearization identification techniques from records taken during elevator pulse maneuvers. The results show that for these tests the regression method provides less scatter in coefficient estimates and provides better correlation with the predicted values. Special techniques are developed which allow identification of the coefficients from records taken during landing maneuvers in which the aircraft encounters turbulence while flying in ground effect. Flight test results are presented to illustrate the effects of air turbulence and ground proximity on the estimated coefficient values. Author

N75-30026 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

ESTIMATION OF ELASTIC AIRCRAFT AERODYNAMIC PARAMETERS c05

Robert C. Schwanz and William R. Wells *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)

The importance of including aeroelasticity in aircraft parameter estimation is discussed using the B52E and C-5A aircraft as examples. A parameter estimation method, employing the modal truncation dynamics math model and the maximum likelihood estimation algorithm, is selected to illustrate the computational difficulties that must be solved. A combined in-house and contractual research program is then outlined that addresses these anticipated problem areas. The aircraft selected for the initial application of the methods is the B52E that was flown in the Control Configured Vehicle (CCV) research program of the AF Flight Dynamics Laboratory. Author

N75-30027# Advisory Group for Aeronautical Research and Development, Paris (France).

IMPACT OF ACTIVE CONTROL TECHNOLOGY ON AIRPLANE DESIGN

Jun. 1975 318 p refs In ENGLISH and partly in FRENCH Presented at a Joint Symp. of the Flight Mech. Panel and Guidance and Control Panel of AGARD, Paris, 14-17 Oct. 1974 (AGARD-CP-157) Avail: NTIS HC $9.25

The papers are reported which were presented at sessions on active control technology in advanced airplane design, analysis and simulation programs, flight test programs, advanced flight control systems, and current operational systems. They cover a wide range of activities, from advanced research to systems in operation on the C-5A and Boeing 747 aircraft. For individual titles, see N75-30028 through N75-30051.

N75-30028 Societe Nationale Industrielle Aerospatiale, Toulouse (France).

CCV PHILOSOPHY: SEMANTICS AND UNCERTAINITY. THE CONCEPT OF AIRCRAFT REVOLUTION BY PROGRESS IN THE FLIGHT CONTROL SYSTEM [CCV PHILOSOPHIE: SEMANTIQUE ET INCERTITUDES LA CONCEPTION DES AVIONS VA-T-ELLE ETRE BOULEVERSEE PAR LES PROGRES DANS LES SYSTEMES DE COMMANDES DE VOL] c05

P. Lecomte and M. Bossard *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs In FRENCH; ENGLISH summary (For availability see N75-30027 21-01)

The possible definitions are examined of the term control configured vehicle (CCV) and some other associated notions such a autostabilization, flight by wire, etc. The characteristics common to all the so called CCV systems are examined simultaneously, together with the most noteworthy differences encountered. The present possibilities of these systems are reviewed, considering, for each case, the safety objectives, and performance objectives for transport and combat aircraft. Finally, long term prospects are considered. Author

N75-30029 Royal Aircraft Establishment, Bedford (England).

ACTIVE CONTROL AS AN INTEGRAL TOOL IN ADVANCED AIRCRAFT DESIGN c05

W. J. G. Pinsker *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

The scope of active control in the design and operation of aircraft is broadly reviewed, and the automatic control, stability and control augmentation, artificial static stability, gust alleviation, stall and spin protection and various methods for reducing airframe loads are studied. It is argued that active control should not be treated as a piece-meal solution to isolated design problems but rather refinements will the true potential of these powerful techniques be realized. In particular it is shown that many CCV applications require commensurate improvement in the aerodynamic performance of the control surface. Author

N75-30030* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

POTENTIAL BENEFITS TO SHORT-HAUL TRANSPORTS THROUGH USE OF ACTIVE CONTROLS c08

D. William Conner and Glenn O. Thompson (Boeing Co., Wichita, Kans.) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 10 p refs (For availability see N75-30027 21-01)

The potential applications of active controls are examined for improving the characteristics of transport type aircraft used in short-haul service (< 1,000-kilometer range capability). The types of aircraft to meet future needs (quiet operation, congestion alleviation, fuel conservation, operating economy, and traveler acceptance) are identified as helicopters for shorter stage lengths and fixed wing aircraft of reduced field-length capability for longer stage lengths. Likely uses for active controls for these aircraft are examined regarding payoffs which can be expected and problems and constraints which must be dealt with. Uses showing significant benefits include augmented stability and control, gust-load alleviation, and ride smoothing. Gust-load alleviation is particularly effective for low-wing-loading aircraft employing conventional lift. Ride-smoothing systems are indicated to be the furthest advanced and ready for production commitment for those applications where they can be shown to have payoff. Author

N75-30031 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
TRANSPORT AIRCRAFT WITH RELAXED/NEGATIVE LONGITUDINAL STABILITY: RESULTS OF A DESIGN STUDY **c08**
Heinz G. Klug *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p (For availability see N75-30027 21-01)

Application of active longitudinal control on transport aircraft with relaxed/negative longitudinal stability was studied. Using two aircraft of different configuration as baseline designs, versions incorporating active longitudinal control were derived. Configuration changes were studied with varying tail size, and center of gravity position. Based upon the requirement for handling qualities equivalent to the baseline designs, optimum control laws were derived. Controllability and stability were checked by simulating various gust cases. Limits for tail size and cg-position were derived. Wing size was changed where required to hold performance unchanged. Structural and fuel weight changes were calculated and the configuration, within the geometrical and controllability limits, giving the highest payload increase, was selected. Sensitivity of payload benefit to performance specification was checked by parametric variations. It was found that payload benefit depends upon configuration to a high degree. Best payload benefit will be achieved for high wing, T-tail STOL aircraft using large trailing edge flaps. Payload increase may be up to 15% for such aircraft. Author

N75-30032 British Aircraft Corp., Weybridge (England). Commercial Aircraft Div.
IMPACT OF ACTIVE CONTROL TECHNOLOGY ON AIRCRAFT DESIGN **c08**
P. R. G. Williams and B. S. Campion *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 6 p (For availability see N75-30027 21-01)

Use of active control technology on civil transport aircraft is considered, both as regards improvement of a conventional aircraft and as regards development of new configurations to exploit such technology. Significant gains in weight and operating cost may be made by using artificial stability augmentation and load alleviation on a conventional design, though the precise gains depend on the way in which weight savings are exploited. Unconventional means are suggested whereby active control technology might best be exploited on short and long range subsonic aircraft, and also on supersonic aircraft. It appears that the largest gains are likely to be made when new techniques are used in combination rather than singly. Author

N75-30033 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
HORIZONTAL CANARDS FOR TWO-AXIS CCV FIGHTER CONTROL **c08**
S. C. Stumpfl and R. A. Whitmoyer *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 8 p refs (For availability see N75-30027 21-01)

The potential use is described of active horizontal canards in the design of fighter aircraft to provide flight path control along both the longitudinal and directional axes. The results are based on wind tunnel tests conducted on two CCV fighter configurations under the Fighter CCV Program of the USAF Flight Dynamics laboratory. A method for generating direct sideforce using differentially deflected horizontal canards is discussed. The direct lift control capabilities of horizontal canards are also presented. In addition, the use of horizontal canards in implementing the concepts of relaxed static stability and maneuver polar enhancement is described. Finally, the USAF Fighter CCV Program is outlined as it relates to demonstrating the performance improvements achievable through application of advanced control system technology. Author

N75-30034 Hawker Siddeley Aviation Ltd., Brough (England).
ACTIVE CONTROL TECHNOLOGY: A MILITARY AIRCRAFT DESIGNER'S VIEWPOINT **c08**
R. Melling *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 16 p (For availability see N75-30027 21-01)

The most likely gains to be obtained by the application of active control technology to small combat aircraft are considered. There are seen to be considerable attractions, although the most significant benefits may turn out to be orientated towards the improved control and design freedom offered by ACT rather than towards revolutionary shapes or greatly increased efficiency or reduced weight. In the design of the ACS itself, it is considered essential that a mechanical back up is avoided in order to produce a more flexible, efficient and safe system, and to this end a suitably progressive system design philosophy must be developed. Despite some doubts as to the more ambitious claims for ACT, its ultimate adoption is expected for all but the simplest of aircraft. Author

N75-30035 National Aerospace Lab., Amsterdam (Netherlands).
HANDLING QUALITY CRITERIA DEVELOPMENT FOR TRANSPORT AIRCRAFT WITH FLY-BY-WIRE PRIMARY FLIGHT CONTROL SYSTEMS **c08**
H. A. Mooij *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs (For availability see N75-30027 21-01)

The introduction of fly-by-wire primary flight control systems in future transport aircraft, in some cases including direct-lift-control, makes it highly desirable to initiate further studies into handling quality criteria for future guidance in system design. The handling quality criteria for such aircraft must be based on parameters which describe the combination of the aircraft and its closed-loop flight control system. Approach flight simulation and compensatory tracking, performed on a three degrees of freedom flight simulator as applied to a conceptual jet transport developed around the relaxed static stability concept, is described. The stiffness of the pitch attitude system and the effectiveness of the direct-lift-control-system were varied. The following topics are discussed: required direct-lift-control-effectiveness for an aircraft with a very low value of the normal acceleration sensitivity, required bandwidth of the pitch attitude control system for an aircraft with a value of the normal acceleration sensitivity typical for the present-day jumbo aircraft, pilot opinion on the absence of a stable stick force/(deflection) versus airspeed gradient for pitch-stabilized aircraft, results of compensatory tracking experiments, and evaluation of the applicability of the criterion for the configurations tested. Author

N75-30036 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
CONTROL OF AN ELASTIC AIRCRAFT USING OPTIMAL CONTROL LAWS **c08**
Werner Dressler *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 11 p (For availability see N75-30027 21-01)

The design of a multivariable control system for gust alleviation is demonstrated. The use of computers for control design, summarized under the name computer aided design is described. The gust control system for gust alleviation is integrated into an overall flight guidance control system. Two control designs, using optimal control laws, are achieved, one with complete and the second with incomplete state measurement. In the model description the elastic behavior of the wing is included as well as the nonsteady aerodynamic lift generation and the dynamic behavior of the actuators. For a STOL-transport aircraft the efficiency of gust alleviation are shown in a flight through turbulent air. The increase of wing lifetime and the corresponding decrease in structure weight by use of a gust alleviation system is calculated. Author

N75-30037 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CLOSED FORM EXPRESSION OF THE OPTIMAL CONTROL OF A RIGID AIRPLANE TO TURBULENCE **c08**
Gabriel Coupry *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 10 p refs In FRENCH; ENGLISH summary (For availability see N75-30027 21-01)

The flight of military aircraft at high speed, low altitude makes it necessary to use ride control systems to improve comfort, handling qualities and combat ability. The open loop system that is described senses turbulence which is used, after filtering, to act on the controls. Such a system does not change at all the handling qualities of the aircraft. Wiener's theory is used to to derive in closed form the transfer function of the filter used for control. It is shown that this transfer function can be expressed

in autoadaptative form, the poles being proportional to the velocity of the aircraft. The influence of parameters like mass, scale of turbulence, is discussed. Author

N75-30038 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.

APPLICATION OF ADVANCED MODEL-FOLLOWING TECHNIQUES TO THE DESIGN OF FLIGHT CONTROL SYSTEMS FOR CONTROL CONFIGURED VEHICLES c08

Gerd Hirzinger *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p refs (For availability see N75-30027 21-01)

After a review of optimal control, the model-following concept is applied for approaching a desired tracking behavior, especially concerning the airplane's response to a flight path angle command, in a systematic way. However, it turns out that the disturbance behavior of the controlled system, represented by the airplane's response to an initial deviation in the flight path angle, is unsatisfactory. Therefore a new concept combining model-following and partial state-vector feedback is applied for designing disturbance behavior and tracking behavior separately, in each of both cases achieving a good compromise between the desired system trajectory and limited control action. It appears that the control system thus designed is very insensitive to variations in the most critical parameter, that is the location of the center of gravity. Author

N75-30039 McDonnell Aircraft Co., St. Louis, Mo.

SURVIVABLE FLIGHT CONTROL SYSTEM: ACTIVE CONTROL DEVELOPMENT, FLIGHT TEST, AND APPLICATION c08

F. M. Krachmalnick, R. L. Berger (AFFDL), J. E. Hunter, J. W. Morris (AFFDL), and J. K. Ramage (AFFDL) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 24 p (For availability see N75-30027 21-01)

The major portion of the Survivable Flight Control System (SFCS) Program initiated by the United States Air Force in July 1969 was performed to establish the practicality of active control concepts for use in future military aircraft. The SFCS quadruplex (four channel redundancy) primary flight control system is described. Incorporation of this type of control system in a tactical vehicle is expected to provide benefits in enhanced survivability, reliability, maintainability, cost of ownership, aircraft design freedom, and aircraft maneuvering performance. The simulations and ground-based system compatibility testing, performed to verify equipment performance and establish high level of pilot confidence prior to flight, are discussed. A summary of the flight test results obtained during 84 successful flights is presented. Flight test results indicate that the F-4 with the SFCS installed exhibits greatly improved handling qualities over those characteristic of the production F-4. This aircraft incorporating control configured vehicle and maneuver load control conceptual features was successfully test-flown and evaluated. Results obtained from the pilot-in-the-loop simulations and actual flight tests are discussed. Flight test results verify that significant performance improvements in combat maneuvering envelope, buffet levels, and specific excess power are achievable in the F-4 with judicious application of control configured vehicle concepts. Author

N75-30040 Air Force Armament Lab., Eglin AFB, Fla.

WEAPON DELIVERY IMPACT ON ACTIVE CONTROL TECHNOLOGY c08

H. Smith and Dave Carleton (AFFDL) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1971 14 p refs (For availability see N75-30027 21-01)

The need for cooperative efforts among the laboratories/test-organizations and users is emphasized to improve and properly match aircraft pointing and armament component accuracies to achieve the maximum effectiveness with conventional weapons. The Data Measurement Programs of the Armament Development and Test Center/Air Force Armament Laboratory are discussed, including the results and plans for the Instrumented Rack/Bomb and Gunnery Pipper/Fireline Trace and Impact Pattern Model Programs. The Active Control Technology Programs of the Air Force Flight Dynamics Laboratory including objectives, designs, and results of the Tactical Weapon Delivery (TWeaD) Program are discussed. The objectives of the Multimode Control and the Control Configured Vehicle/Advanced Fighter Technology Integrator Programs are delineated. It is concluded that incorporation of active control technology and matched armament component accuracies in future weapon systems shows promise for considerable improvement in the effectiveness of unguided weapons. Author

N75-30041 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

CONTROL CONFIGURED VEHICLES B-52 PROGRAM RESULTS c05

Bruce T. Kujawski *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 8 p refs (For availability see N75-30027 21-01)

The concepts considered for the CCV B-52 program, and the expected benefits are discussed. The system design criteria are described along with the maneuver load control system. An off design condition is evaluated. F.O.S.

N75-30042 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

A QUADRUREDUNDANT DIGITAL FLIGHT CONTROL SYSTEM FOR CCV APPLICATION c08

Wolfgang J. Kubbat *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 9 p (For availability see N75-30027 21-01)

A parallel redundant digital fly-by-wire system is described. It will be tested in the near future on a CCV-test aircraft (modified F-104 G). Starting from a fail-op, the reasons for the choice of a digital system are outlined. The system works with freely programmable identical airborne computers which run identical software. The computers perform the control laws and act also as central voters and monitors. Basic of the design is the principle of majority decision with elimination of a failed component. Finally the Quadruplex system represents a functional integration of autopilot, stabilization, air data computation and built-in-test-equipment. Author

N75-30043 Naval Air Development Center, Warminster, Pa.

THE ASSET (ADVANCED SKEWED SENSORY ELECTRONIC TRIAD) PROGRAM c08

C. R. Abrams and W. D. Weinstein (Grumman Aerospace Corp.) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

A redundant arrangement of angular rate sensors with skewed input axes, dispersed on an aircraft bulkhead, was designed for fly-by-wire control applications. Compared to other redundant configurations, it best satisfied system reliability, survivability, and maintenance requirements. By also utilizing a high reliability solid-state angular rate sensor, expected maintenance costs will be decreased. The data management system designed for the ASSET configuration featured a parallel path failure detection and isolation algorithm. A unique method of selecting failure thresholds was developed to insure that false alarm probability and system errors were minimized. The results of this effort will contribute to the practical implementation of a digital fly-by-wire system, since a successful attempt was made to match proposed operational requirements. The ASSET concept will therefore provide a fail-operational and combat-survivable set of rate sensors designed to interface with all active control systems, regardless of redundancy requirements. Author

N75-30044 Marconi-Elliott Avionic Systems Ltd., Rochester (England). Flight Control Div.

THE RELEVANCE OF EXISTING AUTOMATIC FLIGHT CONTROL SYSTEMS TO THE FUTURE DEVELOPMENT OF ACTIVE CONTROL c08

R. Ruggles, D. Sweeting, and I. A. Watson *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p refs (For availability see N75-30027 21-01)

Some relevant examples of failure-survival automatic flight control systems are examined to show how the results of their design, implementation and operational usage can contribute to the successful introduction into full-time use of active control technology (ACT). Ground rules which were evolved some years ago for such redundant systems are re-examined in the interest of full-time ACT. The important parameters affecting the successful

design of a full-time ACT system are discussed. Some of the problem areas are mentioned and the use of some existing techniques for successful certification are suggested. The step from current fail-operative systems relying on some reversionary system to full-time ACT is examined. The design requirements for the hardware and software for digital computations are detailed and some special problems of digital systems are highlighted and solutions are suggested. Some of the problems of system components such as sensors, computers and actuators are discussed. Author

N75-30045 Sperry Rand Corp., Phoenix, Ariz. Sperry Flight Systems.
PRODUCTION DESIGN REQUIREMENTS FOR FLY BY WIRE SYSTEMS c05
J. Flannigan and J. Emfinger *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 11 p refs (For availability see N75-30027 21-01)

The problems of specifying design requirements for production Fly-By-Wire (FBW) flight control systems are addressed based on current state-of-the-art trends. The design goals and requirements of two development FBW programs are reviewed. Emphasis is placed on the impact of specific requirements on hardware mechanization complexity. Of particular interest is the sensitivity of FBW system design to safety, survivability and mission reliability requirements, and to related subsystem and interface concepts. Experience to date is used to provide recommendations and insight into specifying practical design requirements for production FBW systems. Author

N75-30046 British Aircraft Corp. (Operating) Ltd., Bristol (England). Avionics Engineering Dept.
EXPERIENCE WITH THE CONCORDE FLYING CONTROL SYSTEM c08
Neville Brenchley and Ronald Grant *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p (For availability see N75-30027 21-01)

The Concorde Flight Control System is discussed along with its performance, reliability, and behavior in flight. Possible future developments are considered. Author

N75-30047 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
DESIGN OF AN ENTIRELY ELECTRICAL FLYING CONTROL SYSTEM c08
G. Broihanne, R. Deque, and M. Bossard *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 13 p (For availability see N75-30027 21-01)

After reviewing the reasons for using entirely electrical flying controls, that is controls without mechanical standby systems, and defining the control modes available for a transport aircraft, the general architecture of the system is described. It is shown that if safety requirements impose minimum redundancy, several precautions must be taken for the theoretical reliability achieved by this redundancy to be real. The equipment required is described briefly. From a maintenance point of view, the complexity of the system is compared with that of the flying controls on existing aircraft. Author

N75-30048 Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.
THE HUNTER FLY-BY-WIRE EXPERIMENT: RECENT EXPERIENCE AND FUTURE IMPLICATIONS c08
F. R. Gill and P. W. J. Fullham *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

The impact of active control technology on the design of future aircraft depends on the development of full-time and full authority control systems which have an integrity similar to that of the basic airframe. One of the major items of the R and D Programme in the UK which is aimed at providing this flight experience with this system is described. The implications of the future application of active control technology are discussed in terms of the airworthiness problem; and the manner of designing systems so as to ease the certification of high integrity, full-time and full authority control. Author

N75-30049* National Aeronautics and Space Administration, Flight Research Center, Edwards, Calif.
F-8 DIGITAL FLY-BY-WIRE FLIGHT TEST RESULTS VIEWED FROM AN ACTIVE CONTROLS PERSPECTIVE c08
Kenneth J. Zalai and Dwain A. Deets *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs (For availability see N75-30027 21-01)

The results of the NASA F-8 digital fly-by-wire flight test program are presented, along with the implications for active controls applications. The closed loop performance of the digital control system agreed well with the sampled-data system design predictions. The digital fly-by-wire mechanization also met pilot flying qualities requirements. The advantages of mechanizing the control laws in software became apparent during the flight program and were realized without sacrificing overall system reliability. This required strict software management. The F-8 flight test results are shown to be encouraging in light of the requirements that must be met by control systems for flight-critical active controls applications. Author

N75-30050 Boeing Commercial Airplane Co., Seattle, Wash.
USE OF ACTIVE CONTROL TECHNOLOGY TO IMPROVE RIDE QUALITIES OF LARGE TRANSPORT AIRCRAFT c08
Gerald C. Cohen and Richard L. Schoenman *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 16 p refs (For availability see N75-30027 21-01)

The analyses, construction, and flight testing of two systems, Beta-vane, and modal suppression augmentation system (MSAS), which were developed to suppress gust induced lateral accelerations of large aircraft are described. The Boeing 747 transport was used as the test vehicle. The purpose of the Beta-vane system is to reduce acceleration levels at the dutch roll frequency whereas the function of the MSAS system is to reduce accelerations due to flexible body motions caused by turbulence. Data from flight test, with both systems engaged, shows a 50-70 percent reduction in lateral aft body acceleration levels. It is suggested that present day techniques used for developing dynamic equations of motion in the flexible mode region are limited. These techniques produce results which are satisfactory for analyzing dynamic loads and stability problems, but may be insufficient for development of active control systems operating in the same frequency region. Author

N75-30051 Lockheed-Georgia Co., Marietta.
THE C-5A ACTIVE LIFT DISTRIBUTION CONTROL SYSTEM c08
William F. Grosser, Wayne W. Hollenbeck, and Don C. Eckholdt *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1971 18 p refs (For availability see N75-30027 21-01)

The technical details are presented of the development of the Active Lift Distribution Control System (ALDCS) for the C-5A aircraft. A structural loads, and flutter-control system interaction are developed in such a way that the unique aspects of the analysis, aeroelastic wind tunnel test, and flight test portion are bound together to indicate the system design characteristics performance. The purpose of the ALDCS is to reduce gust and maneuver incremental wing root bending moments while minimizing the effects of the control system on torsion, flutter, and flying qualities. These criteria are based on axial load reduction as a means of improving wing fatigue endurance without significantly affecting existing flutter margins or handling qualities. Even though this is a retrofit system which was required to use as much existing hardware as possible, throughout the flight test all design goals were met. The system is currently planned to be manufactured and installed on the fleet during the next several years. Author

N75-30052# Advisory Group for Aerospace Research and Development, Paris (France).
THE GUIDANCE AND CONTROL OF V/STOL AIRCRAFT AND HELICOPTERS AT NIGHT AND IN POOR VISIBILITY
May 1975 281 p refs In ENGLISH and partly in FRENCH
Presented at the 18th meeting of the Guidance and Control Panel of AGARD, Stuttgart, 14-16 May 1974
(AGARD-CP-148) Avail: NTIS HC $8.75

Reports are presented concerning (1) requirements, tasks, and environments; (2) performance and design of low light,

infrared, and other sensors; (3) man/machine interface; (4) navigation and guidance; and (5) implications on flight control, and autopilot design. For individual titles, see N75-30053 through N75-30081.

N75-30053 Ministry of Defence, Bonn (West Germany).
THE USE OF HELICOPTER CAPABILITIES IN BAD WEATHER NEEDS AND REQUIREMENTS FOR FUTURE EQUIPMENT c05
K. W. Ernst *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p (For availability see N75-30052 21-01)

The operational requirements and problems for improving the use of helicopters in bad weather conditions are discussed. The characteristics for the wide spectrum of applications are given along with flight profiles for bad weather. F.O.S.

N75-30054 Army Operational Test and Evaluation Agency, Fort Belvoir, Va.
TRADEOFFS BETWEEN CREW TRAINING AND EXOTIC EQUIPMENT FOR NIGHT AND FOUL WEATHER FLYING c06
Elmer R. Ochs *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 2 p (For availability see N75-30052 21-01)

The requirement for an all-weather, night flying capability is discussed. The solution to achieving this capability is some combination of man-machine capability. A combination which must be reasonably attainable and which represents the best balance between the benefits and burdens associated with both the man and the machine. If the focus is weighted toward the man portion of the equation in order to reduce the machine cost and maintenance burdens, the risk is faced of creating an unacceptable training burden. If the focus shifts too far toward the machine solution, the converse overburden may result. A first step in attacking the problem is to determine the boundaries. The outer boundary is represented by the state of the art while the inner boundary is a full appreciation of what can be accomplished with current assets. A clear understanding of this inner boundary or base line is necessary to objectively assess the additional man-machine requirements which will provide a viable night, foul weather flying capability. Author

N75-30055 Army Combat Developments Experimentation Command, Fort Ord, Calif.
EFFECT ON NAP-OF-THE-EARTH REQUIREMENTS ON AIRCREW PERFORMANCE DURING NIGHT ATTACK HELICOPTER OPERATIONS c05
In AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p refs (For availability see N75-30052 21-01)

Night nap-of-the-earth (NOE) flight is described as it relates to three major areas: man, machine, and operational use. The findings and operational experience reported were encountered in exploratory efforts for a major field experiment. Activities discussed include aviator selection and training, psychological and physiological effects, mission planning, map reading and terrain interpretation, aircraft handling, emergency procedures, and man-machine operations. Behavioral research requirements and other needs established for night NOE training and operations by current scout and attack helicopters are presented, and a training program for night NOE training is offered as a general guideline. Author

N75-30056 United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
H-53 NIGHT OPERATIONS c05
Richard L. Mills *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs (For availability see N75-30052 21-01)

The H-53 Night Operation System (NOS) includes night vision equipment and an approach and hover coupler. The automatic approach and hover coupler subsystem permits the pilot to transition automatically over all types of terrain, including mountains, from search altitude and cruise speed to a hover and automatically maintain the hover. The night vision equipment extends this capability to night flights. The basic system was declared operational by the United States Air Force following a ninety-day combat evaluation in Southeast Asia. It is also used by foreign military. Extensive flight testing and operational use have led to additional development tests to further the capabilities of NOS. Flight test results of a prototype symbology generator and prototype electronic location finder hover coupler are discussed along with the night vision equipment and the approach and hover coupler. Author

N75-30057 Human Engineering Labs., Aberdeen Proving Ground, Md.
US ARMY EXPERIENCE IN LOW-LEVEL NIGHT FLIGHT c05
Robert W. Bauer *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

During the period of U.S. conflict in Southeast Asia there were a number of air operations conducted under adverse visibility conditions or at night. There were even a few night operations involving large numbers of aircraft, but most were made up of one or two aircraft, engaged in an insertion, extraction, long-range patrol or supply movement. Some lessons learned from these experiences are reviewed. Current developments and testing have demonstrated an improved capability in night flight, using either selected specialists without night vision systems or a wider group of aviators aided by the night vision goggles. The electroluminescent formation flight lights and rotor-tip lights have greatly increased safety in formation flights at night. But each approach has been hampered by design limitations in display panels, poor lighting quality and poor lighting control in the aircrew stations. Landing in dark unimproved areas, navigation over unfamiliar terrain and target acquisition also present special problems which have not yet been completely overcome. Author

N75-30058 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
REQUIREMENTS FOR OPERATION OF LIGHT HELICOPTERS AT NIGHT AND IN POOR VISIBILITY c03
M. Rade *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 12 p refs (For availability see N75-30052 21-01)

Normally the VTOL-ability of helicopters is not used under Instrument Flight Rules. For helicopter missions at night and in poor visibility special devices are necessary, but there are only some experimental systems partly derived from devices for fixed wing aircraft. Basic requirements for normal missions will be defined. They include handling qualities, navigation equipment and landing aids. The use of sensors giving high definition pictures of the terrain in nonvisual conditions are considered. Secondary requirements are generated by some problems resulting from the full use of the all weather capability. They consist of the concept of automatic flight-control-systems and display-arrangements for the pilot. These additional requirements depend on the planned missions and on the possibilities, which are given by the type of helicopter. As important conditions for special missions deicing, noise reduction, infrared and radar camouflage will be discussed. Author

N75-30059 Royal Aircraft Establishment, Farnborough (England).
HELICOPTER AVIONICS: UK RESEARCH PROGRAMME c06
H. B. Johnson *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 7 p refs (For availability see N75-30052 21-01)

A limited review of the status of UK avionic systems for helicopters is given and the current needs of military helicopters discussed. The rapidity with which the use of helicopters has grown is such that it is no longer possible to meet these needs by simple modification of off the shelf equipment. A program of research and development work specifically directed towards the needs of helicopters is outlined. This program is centered around the use of a Sea King Mk I helicopter and is aimed at equipping this vehicle with a number of new equipments in the areas of flight control, electronic displays and computer aided navigation. Particular emphasis is placed on the development of night vision systems for use in helicopters and an experimental pilot's TV system is described. This will be used to explore fundamental aspects of imaging systems prior to the use of an LLTV camera for typical night flying tasks. Author

N75-30060 Naval Weapons Center, China Lake, Calif.
MICROWAVE RADIOMETRIC ALL-WEATHER IMAGING AND PILOTING TECHNIQUES **c06**
Robert P. Moore *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p (For availability see N75-30052 21-01)

The Naval Weapons Center (NWC), China Lake, Calif., U.S.A. has developed a millimeter-wave radiometer capable of producing high-quality images. Automatic terrain correlation aircraft navigation was demonstrated using real-time in-flight digital processing. For V/STOL aircraft and helicopter applications during hover and descent, a system capable of rapid two-dimensional scanning will be the most useful. It is indicated that automatic navigation can be carried out with a very economical nonscanning device. Author

N75-30061 Royal Aircraft Establishment, Farnborough (England). Instrumentation and Ranges Dept.
APPLICATIONS OF LOW LIGHT TELEVISION TO HELICOPTER OPERATIONS **c06**
R. J. Corps *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 2 p (For availability see N75-30052 21-01)

The status of LLTV systems in the UK is reviewed. With the aid of cine film, practical results which have been obtained with several systems from helicopters during recent years are presented. Author

N75-30062 Army Electronics Command, Fort Monmouth, N.J. Avionics Lab.
AN OPTICAL RADAR SYSTEM FOR OBSTACLE AVOIDANCE AND TERRAIN FOLLOWING **c06**
C. M. Kellington *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

The operational requirements are discussed for obstacle avoidance and terrain following systems, the nature of obstacles, the tradeoff considerations involved in the selection of a laser for a system and finally a unique state of the art carbon dioxide (CO_2 - 10.6 micron) laser radar system presently under development. Atmospheric penetration properties of the 10 micron radiation which permit moderate weather operation are deduced. The main thrust centers around a technical description of the CO_2 system which is called the Laser Obstacle/Terrain Avoidance Warning System (LOTAWS). System parameters e.g., 30 KHz pulse rate, 10 watts average power, 1/3 milliradian beamwidth, 300 nanosecond pulse width, 20 deg x 20 deg field of view, etc., and the methods by which they are achieved are discussed. Other system characteristics including the local oscillator, IF bandwidth, AFC loops, scanner and scan patterns, signal processing, and display to the pilot are discussed. Finally, plans for integration of the LOTAWS with other airborne equipment, including forward looking IR sensors and flight tests beginning in 1974 are outlined. Author

N75-30063 Royal Radar Establishment, Malvern (England). Airborne Radar Group.
IR THERMAL IMAGING SENSORS FOR HELICOPTERS **c06**
F. A. Holmes *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 4 p (For availability see N75-30052 21-01)

The general requirements are considered for night vision sensors which can assist the helicopter crew in their flying and tactical tasks during night operations. It is shown that two classes of sensors are needed, one for the pilot to fly the helicopter and the other for surveillance and target acquisition. The performance parameters required for each class of sensor are analyzed and some of the constraints and compromises on the sensor design are considered. The parameters thus derived show that a common sensor is not compatible for both the flying and target acquisition functions. Some of the vehicle integration and systems interface aspects are discussed to indicate that the final cost-effective choice is most likely to be determined from the overall system considerations rather than that of the IR sensor. Display requirements for both functions are shown to lead to larger units than are currently considered possible for cockpit installation, and matching of the sensor, display and operator performances are likely to be the main problem in future systems. Author

N75-30064 Army Night Vision Lab., Fort Belvoir, Va.
NIGHT VISION IMAGING SYSTEM DEVELOPMENT FOR LOW LEVEL HELICOPTER PILOTAGE **c06**
Karl Stich *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 5 p (For availability see N75-30052 21-01)

Flight test data of low level night operations in UH-1 helicopters using electro-optical image forming sensors as a pilot flight aid are presented, along with details of the systems used in the investigations. Significant findings and major problem areas driving future work are given along with some present night vision pilot aids. Finally, long-range night vision developments for helicopter pilotage are examined. Author

N75-30065 Army Electronics Command, Fort Monmouth, N.J. Avionics Lab.
LOW LEVEL NIGHT OPERATIONS OF TACTICAL HELICOPTERS **c05**
William J. Kenneally *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 14 p refs (For availability see N75-30052 21-01)

Initial results are presented of the U.S. Army's Low Level Night Operations Program, an on-going research program to define Avionic equipment parameters for low level night and adverse weather conditions. Results of the program include quantitative data on the performance of pilots flying at low level with varying levels of avionic equipment augmentation (e.g. none, Night Vision Goggles, FLIR, LLLTV and Radar); simulation and experimental flight test data on conceptual systems (e.g. symbolically augmented visual imaging systems) as well as experimental measurements of various candidate hardware for obstacle detection. The results are utilized to develop preliminary conceptual avionic systems for low level night operations as well as to identify areas in which additional research is required. Future research efforts directed to identified barrier problems are also presented. Author

N75-30066 Royal Radar Establishment, Malvern (England).
TERRAIN AVOIDANCE RADAR USING OFF-BORESIGHT TECHNIQUES **c06**
W. M. Nixon *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

The two dimensional techniques (height, range) used in Terrain-Following systems were extended to three-dimensions (height, range, distance off-track) by the use of off-boresight processing. Such techniques enable the high data rate volumetric cover required in Terrain-Avoidance (TA) systems to be achieved. Various methods of off-boresight processing are mentioned and the amplitude/phase conversion method used in an experimental UK, monopulse radar is described in some detail. Signal validation techniques which reject signals of small amplitude or which appear from outside the calibrated angular range of the system are described and a possible method of presenting the TA information to a pilot is shown. A simple approach was made to the comparison of amplitude monopulse and interferometer systems. It is concluded that there is little difference in the sensitivities of the two systems in general but that operational constraints will govern the choice between them. Author

N75-30067 Princeton Univ., N.J. Dept. of Aerospace and Mechanical Sciences.
DISPLAY FOR APPROACH AND HOVER WITH AND WITHOUT GROUND REFERENCE **c06**
Theodor A. Dukes *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01) (Contracts DAAB07-72-C-0161; DAAB07-74-C-0051)

The various elements of flight variable information available from an image display are discussed from the point of view of image enhancement by means of superimposed symbology. The significance of a heading reference for accurate positioning is emphasized. Two particular symbology formats are described. For approach and hover unaided by ground based instrumentation, the position information obtainable from an image display is

improved by superposition of an electronically stabilized 'terrain marker'. If a radiating point source is available on the ground, quantitative error information can be derived from suitable instrumentation, and the deviation from a nominal point can be displayed superimposed on the image. Additional flight variable information (horizon, airspeed, climb rate, etc.) is also incorporated. Author

N75-30068 Royal Aircraft Establishment, Farnborough (England). Avionics Dept.

THE FLIGHT DEVELOPMENT OF ELECTRONIC DISPLAYS FOR V/STOL APPROACH GUIDANCE c06

J. N. Barrett and R. G. White *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 16 p refs (For availability see N75-30052 21-01)

Two series of flight trials are described which were aimed at the development of electronic displays for the approach guidance of V/STOL aircraft in visual and IFR conditions. The first series of trials was flown in the Canadair CL84 and was aimed at extending the approach capability of current operational V/STOL aircraft. The second, flown in the Shorts SC1, investigated the terminal guidance of inter-city VTOL transport aircraft. Performances achieved in the two trials are discussed, and display and flight control system changes are recommended. Author

N75-30069 Royal Aircraft Establishment, Farnborough (England). Experimental Flying Dept.

PILOTING ASPECTS OF V/STOL APPROACH GUIDANCE c05

C. C. Rustin *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01)

A pilot's viewpoint is presented of the results of the handling, display, and operational aspects encountered during the flight trials of the CL-84 and SC-1 aircraft. Author

N75-30070 Bell Helicopter Co., Fort Worth, Tex.

RESEARCH ON DISPLAYS FOR V/STOL LOW-LEVEL AND IMC OPERATIONS c06

Dora Dougherty Strother and Hubert W. Upton *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 11 p refs (For availability see N75-30052 21-01)

The results of several research studies covering cockpit displays and their effect on the performance of helicopter pilots. These studies evaluated displays used for the guidance and control of helicopters at night and in restricted visibility, especially for operations at extremely low altitudes. Author

N75-30071 Human Engineering Labs., Aberdeen Proving Ground, Md.

FLIGHT SYMBOLOGY AUGMENTATION OF SENSOR DISPLAYS c06

William B. DeBellis and Clarence A. Fry *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs (For availability see N75-30052 21-01)

A study is described in which scales were designed to provide altitude, airspeed, and heading information, and were combined into six candidate flight display formats. Both moving and fixed scales are considered. A repeated measure factorial experiment was designed to use response time and control error as dependent variables, and display format and scale indication as independent variables. Twelve Army aviators flew each format under static base simulation condition by providing a cyclic control stick response to various scale value changes. It was hypothesized that display formats with markedly differing scale types would strongly affect the pilot's response times and errors, but multivariate and univariate analysis of variances did not verify this hypothesis. There were pronounced differences, but only between individual scale indications. Significant differences in pilot performance between display formats arose from differences in scale factor rather than from the types of scales. Author

N75-30072 Standard Electrik Lorenz A.G., Stuttgart (West Germany).

NEW RADIO NAVIGATION AIDS BASED ON TACAN PRINCIPLES c04

M. Boehm and E. Coors *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 22 p (For availability see N75-30052 21-01)

The German TACAN family concept with MITAC as an advanced micro-TACAN airborne equipment, FOTAC as a station keeping system, ORTAC-M as a new enroute navigation aid, and SETAC as a landing aid, meets tactical requirements for cargo as well as attack helicopters with reasonable cost of procurement and ownership. Small radio aids for special purposes can be derived from this equipment family (for example, short range omnidirectional beacon (SROB)). The TACAN-mini-beacon SROB works with a 15 Hz-modulation-signal only, and gives omnidirectional azimuth and distance information to an aircraft within 30 NM of the station. The antenna system works without movable parts and generates a rotating cardioid-pattern by feeding RF-energy from an electronic goniometer to fixed radiating elements. Precautions were taken to achieve highly precise horizontal patterns independent of the operating frequency, thus keeping the inherent error of the system F less than or equal to 3 deg over the entire TACAN-band. Experiments under field conditions, using a normal TACAN-airborne-equipment, show the desired operational properties of the system. Author

N75-30073 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

A GUIDANCE SYSTEM FOR FIXED OR ROTARY WING AIRCRAFT IN APPROACH AND LANDING ZONES c04

Jean Besson *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs In FRENCH; ENGLISH summary (For availability see N75-30052 21-01)

The proposed system for guiding fixed or rotary wing aircraft in approach and landing zones makes use of the time-frequency principle. It ensures all weather guidance over a few kilometers or, in a more sophisticated form, the ground control of aircraft in approach. It is based on the measurements of the distance separating the moving vehicle from a number of ground stations. Its main advantages are: the use of independent measurements, time multiplexing avoiding frequency cluttering, and the possibility of entering into a multifunction integrated system. Author

N75-30074 VDO-Luftfahrtgeraete Werk Adolf Schindling G.m.b.H., Frankfurt (West Germany).

THE NUCLEAR LANDING AID FOR HELICOPTERS DURING THE FINAL APPROACH PHASE c06

Karl H. Busch *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 13 p (For availability see N75-30052 21-01)

A method and procedure are described for landing a helicopter in poor visibility on a beam generated by two gamma-ray sources. The one source gives the pilot the distance on the flightpath to go and to land safely in front of the source, the other gives pitch- and bank-commands indicated with a cross-pointer-instrument. The aim was to get a light weight, unsophisticated device with simple ground equipment for which batteries and power generators can be omitted. The prototype-equipment on board the helicopter consists of three gamma-ray detectors and one electronic box to drive the instruments, while the ground equipment consists of one shielding case with both the sources and collimators inside. The center line of the beams can be adjusted to different pitch angles by turning the case around the horizontal axis. Author

N75-30075 MEL Equipment Co. Ltd., Crawley (England).

DEVELOPMENTS IN THE MADGE LANDING AID c06

D. Atter *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 7 p refs (For availability see N75-30052 21-01)

Microwave aircraft digital guidance equipment (MADGE) is a portable approach and landing aid suited to tactical operations involving helicopters, V/STOL, or fixed-wing aircraft operating into secondary airfields and confined landing sites. The equipment is capable of providing the equivalent of civil category-II performance when deployed at runway threshold or on a helicopter pad. Rapid deployment is possible by two men, and the equipment can be operational within 15 minutes of arrival at the landing site. Up-dated information is provided on the development status

of the equipment; some aspects are described of exploitation of the system's flexibility afforded by the integral two-way selectively addressed data link in conjunction with the wide-angle coverage and availability of aircraft coordinates both in the air and on the ground. Author

N75-30076 Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
DEVELOPMENTAL MICRON LABORATORY TEST RESULTS c04
Robert R. Warzynski and George C. Radic *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 3 p (For availability see N75-30052 21-01)

A moderately accurate, low cost of ownership inertial navigator system, called micro-navigator (MICRON) was developed which will satisfy a wide range of applications including V/STOL aircraft and helicopters. The gyroscope for MICRON is an electrostatic gyro (ESG) operated in a strapdown mechanization. The gyro's performance in a developmental MICRON system, designated the N57A-1, was verified. The N57A-1 was subjected to heading sensitivity, repeatability, scorsby, shock, vibration, angular rates, cold soak, and mobile tests; over 70 navigation runs were conducted. The N57A-1 demonstrated performance better than the goals of 1 nm/hr and 5 ft/sec for all tests. Author

N75-30077 Boeing Vertol Co., Philadelphia, Pa.
HEAVY-LIFT HELICOPTER FLIGHT CONTROL SYSTEM DESIGN c08
E. D. Diamond and J. M. Davis *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p (For availability see N75-30052 21-01)

The Army heavy-lift helicopter (HLH) is designed to operate under instrument flying conditions. Dynamic performance, reliability, and survivability considerations, led to selection of a fly-by-wire flight control system with no mechanical backup. Present helicopter handling qualities are generally not acceptable to fly with heavy external loads (up to 35 tons in the HLH case) into unprepared areas under instrument conditions. This mission required development of new helicopter handling qualities including automatic precision hover hold, linear velocity control responses, load stabilization, and automatic approach to hover. Efficient hover and low-speed operations necessitated incorporation of a rear-facing station for a load controlling crewman, who has separate aircraft controls optimized for the precise maneuvering and trim-hold functions required for cargo transfer. Development of the HLH primary and automatic flight control systems is discussed. Pertinent flight simulation and hardware ground- and flight-test results are reported. Author

N75-30078 Royal Aircraft Establishment, Farnborough (England).
HELICOPTER AUTOMATIC FLIGHT CONTROL SYSTEMS FOR POOR VISIBILITY OPERATIONS c08
P. Robinson, J. L. Hollington (Smiths Industries Ltd.), and J. Meadows (Smiths Industries Ltd.) *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 13 p refs (For availability see N75-30052 21-01)

Operations are described which helicopters may be required to carry out at night and in poor visibility. Because of the very high pilot work load likely to arise in these situations, it is shown that the helicopter should be equipped with an autostabilization system having a defect-survival capability. One system which meets this requirement was developed for installation and trails in a Sea King helicopter. This system is triplex, with digital computation and has the development potential to include autopilot facilities, sophisticated control techniques, and extended system redundancy. The redundancy philosophy together with salient design and engineering details of the system are described. Author

N75-30079 Sperry Rand Corp., Phoenix, Ariz.
AN AUTOMATIC FLIGHT CONTROL SYSTEM FOR A HELICOPTER NIGHT LANDING SYSTEM c08
R. J. Miller and E. R. Tribken *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01)

An automatic flight control system (AFCS) is described which provides the vehicle with handling qualities sufficient for the pilot to perform IFR approach and landings manually, using cockpit displays. It provides absolute maximum operational simplicity so as not to contribute to cockpit workload already increased by the requirement to operate display controls. The AFCS provides stability and command augmentation in pitch, roll and yaw, and the pilot relief functions of pitch, roll, heading hold, and both barometric and radar altitude hold. To provide the improved handling qualities required for the night landing problem, feedback gains and shaping were chosen to attenuate basic aircraft response, and to provide model following of the closed-loop system. The rationale behind the specific aircraft response provided by the system for this mission, the establishment of the operational characteristics and procedures, and the implementation of the system are described in detail. Author

N75-30080 Societe de Fabrication d' Instruments de Mesure SFIM, Massy (France).
LOW VISIBILITY APPROACH OF HELICOPTERS AND ADAC AIRCRAFT [L'APPROCHE SANS VISIBILITIE DES HELICOPTERES ET DES AVIONS ADAC. CONSIDERATIONS SUR LE DEVELOPPEMENT ET RESULTATS OPERATIONNELS] c08
J. C. Grisard *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 22 p In FRENCH (For availability see N75-30052 21-01)

The development of prolonged helicopter flight capability without visibility was examined. Automatic pilots and stabilization equipment were studied as possible methods of developing such flight. The SFIM principle was used to develop a family of automatic pilots for utilization in SA 330, SA 321, and the Alouette 3 VSV series helicopters. Operational results covering flight approach, control, and direction are given.
Transl. by E.H.W.

N75-30081 Naval Air Test Center, Patuxent River, Md. Flight Test Div.
US NAVY VTOL AUTOMATIC LANDING SYSTEM DEVELOPMENT PROGRAM c04
Robert S. Buffum, Richard W. Huff, and Gerald L. Keyser *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p (For availability see N75-30052 21-01)

The role of fixed and rotary wing VTOL in military missions was expanded with the advent of the light airborne multipurpose system and the sea control ship concepts. A project is described to coordinate the various technologies which impact on the capability of the pilot, the aircraft system and the landing environment, with a goal of an approach, hover, and landing under instrument meteorological conditions. A number of display and automatic control system development programs which will be of significance in the VTOL hover and landing are discussed. Hovering vehicle versatile automatic control is a research and development automatic flight control system which was utilized to develop the requirements for VTOL automatic approach, hover, and landing. The test program to date includes system definition of the vehicle dynamics via a sine wave forcing function method. Curved and straight path approaches were controlled by the airborne digital computer in a simulated microwave landing system environment. Author

N75-30082# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
CONTRIBUTIONS TO FLUID MECHANICS AND FLIGHT MECHANICS
H. Stuemke, ed. (Stuttgart Univ.) 25 Jul. 1974 234 p refs Partly in ENGLISH and partly in GERMAN
(DLR-FB-74-62) Avail: NTIS HC $7.50; DFVLR, Porz, West Ger. DM 58.10

The treatment of nonlinear problems by the finite element method is discussed. Pressure and drag coefficients were computed for axisymmetric blunt bodies. The behavior of pitot tubes was investigated by visualizing the flow at the nose with ink in a water tunnel. Why characteristics methods are more difficult to program than difference methods, is shown, and a computer dialog program is proposed. The accuracy of thrust

direction and mounting of booster engines are discussed. Magnetohydrodynamic shock configurations in arbitrarily oriented magnetic fields are treated graphically. A transonic wind tunnel is described, and vibration absorbers and dampers are proposed for shock tunnels. The effect of climbing time of various aircraft climbing methods was investigated. The wedge angle of laminar separation bubbles was examined. For individual titles, see N75-30083 through N75-30092.

N75-30083 Stuttgart Univ. (West Germany). Inst. fuer Statik und Dynamik der Luft- und Raumfahrtkonstruktionen.
LARGE NATURAL STRAINS AND SOME SPECIAL DIFFICULTIES DUE TO NONLINEARITY AND INCOMPRESSIBILITY IN FINITE ELEMENTS **c39**
J. H. Argyris, P. C. Dunne, T. Angelopoulos, and B. Bichat *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 79 p refs (For availability see N75-30082 21-01)

The treatment of nonlinear problems by the finite element method is discussed. The concept of natural strains and stresses is extended to large strains in simplex finite elements. Some algorithms developed for structural dynamics are applied to the problem of nonlinear wave propagation, including a case of shock development. Special difficulties in applying displacement finite elements to solar problems with incompressible or nearly incompressible materials are discussed using numerical examples. ESRO

N75-30084 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE EFFECT OF CURVATURE DISCONTINUITIES ON THE SUPERSONIC FLOW PAST AXISYMMETRIC BLUNT BODIES **c02**
D. Eckert *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 21 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

Pressure and drag coefficients were computed for axisymmetric blunt bodies using the inverse method of Van Dyke and the method of characteristics for rotational flows, emphasizing contours with a discontinuity in curvature. Discontinuity effects on pressure along the body, method of characteristics, detached shock wave, and schlieren picture evaluation were investigated analytically. Author (ESRO)

N75-30085 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE EFFECT OF SMALL ROTATION ON THE BEHAVIOR OF PITOT TUBES **c35**
K. Einsfeld *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 15 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

The behavior of pitot tubes was investigated by visualizing the flow at the nose with ink in a laminar water tunnel. It was found that a small rotation in the oncoming flow leads to the formation of an eddy in the bore. Author (ESRO)

N75-30086 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
DIAC: A CHARACTERISTICS METHOD FOR COMPUTER DIALOG **c34**
K. Foerster *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 32 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-30082 21-01)

Characteristics methods were found to exhibit more programming difficulties than difference methods. By utilizing the toposcopic abilities of the human brain in a dialog between man and machine these difficulties are overcome. A pilot system for unsteady pipe flow was established and tested.
Author (ESRO)

N75-30087 Dornier-System G.m.b.H., Friedrichshafen (West Germany).
ACCURACY REQUIREMENTS OF THRUST DIRECTION AND MOUNTING OF BOOSTER ENGINES **c20**
J. T. Heynatz and R. Kapp *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 24 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

Accuracy requirements for the zero start of missiles were derived based on presupposed maximum admissible angles of rotation of the vehicle. These angles were calculated by approximation methods as functions of time and the distance between thrust vector and center of gravity of the vehicle. The influence of the displacement of the center of gravity due to the burning of fuel both in the booster and the vehicle is discussed. The results for launches with and without backwind effects are represented by diagrams and examples. The accuracy requirements of thrust direction are very severe but within technically realizable limits. Author (ESRO)

N75-30088 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE GRAPHICAL TREATMENT OF MAGNETOHYDRODYNAMIC SHOCK WAVES IN FLOWS WITH ARBITRARILY ORIENTED MAGNETIC FIELD **c75**
Manfred Natter *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 30 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

Various shock polar charts were developed in order to study magnetohydrodynamic shock configurations in plasma flows with aligned magnetic and velocity fields. It is shown that those charts (which are a natural extension of the gas dynamic shock polar diagrams of Busemann and Weise) can also be used to calculate the jumps across stationary and pseudo stationary shock waves in the general case of nonaligned fields. Author (ESRO)

N75-30089 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE TRANSONIC WIND TUNNEL AT THE INSTITUTE OF AERO AND GAS DYNAMICS OF THE STUTTGART UNIV. **c09**
E. Schmidt *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 33 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

A transonic wind tunnel with a test section area of 30 x 30 sq cm for intermittent operation and a Mach number range from 0.5 to 1.3 is described. The calibration measurements showed small Mach number deviations for test section walls with normal holes and variable open area ratio, but no sufficient elimination of the reflection of incident expansion waves. Walls with inclined holes and variable open area ratio reduced these interferences below the values of comparable tunnels.
Author (ESRO)

N75-30090 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
VIBRATION ABSORBERS AND DAMPERS FOR WIND TUNNEL MODELS **c09**
G. Schwarz *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 25 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

The large supersonic wind tunnel (shock-tunnel) has an operating time of some tenths of a second only. Oscillation damping of the models was performed originating at the start of the supersonic stream. The damping devices had to be located in the interior of the model. Two different devices were tested with success: a tunable vibration absorber, and damping by inelastic impact. The latter was achieved by partially filling cavities in the models with small lead balls. Though showing a very simple construction, the impact damper has an efficiency comparable with that of the complicated vibration absorber.
Author (ESRO)

N75-30091 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
INFLUENCE ON THE TIME OF VARIOUS CLIMBING METHODS BEYOND THE KAISER TURN **c05**
H. Stuemke *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 15 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

For the climbing flight beyond the singular arc, Kaiser proposes subarcs with constant energy altitude. Subarcs with a maximal climbing or gliding angle were investigated which are still compatible with the assumption of quasistationarity. The climbing times related to these three methods are compared for small deviations of the initial or end state from the Kaiser turn.

The climbing method turns out to be the most favorable.
Author (ESRO)

N75-30092 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE WEDGE ANGLE OF LAMINAR SEPARATION BUBBLES c02
F. X. Wortmann *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 13 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-30082 21-01)

The different behavior of separation bubbles and the mechanism of bubble bursting is described. The role of the transition process is pointed out. It is shown that the wedge angle between the surface and the separating streamline has a strong influence on the transition. An empirical relationship for the size of the wedge angle is given. Author (ESRO)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

N75-30093+ Engineering Sciences Data Unit, London (England).
DRAG OF STREAMLINE SOLIDS OF REVOLUTION (TRANSITION AT 0.1 BODY LENGTH BEHIND NOSE)
Jul. 1973 3 p ref Amendment A
(ESDU-Bodies-02.04.02) Copyright. Avail: NTIS HC $7.50

The total drag coefficient of streamline solid bodies of revolution, with transition from laminar to turbulent flow at 0.1 length behind the nose is plotted against Reynolds number for various diameter/length ratios. Total drag coefficients are determined relative to the surface area of the body. Examples of the application are given. Author

N75-30094+ Engineering Sciences Data Unit, London (England).
WAVE DRAG OF WINGS AT ZERO LIFT IN INVISCID AIRFLOW
May 1975 17 p ref Supersedes Aero-W.S.02.03.01 Sponsored by Roy. Aeron. Soc.
(ESDU-75004) Copyright. Avail: NTIS HC $122.50

Data on wave drag of wings at zero lift are provided for use in estimating missile drag. The data are applicable to wings with symmetrical double-wedge or parabolic-arc sections for all taper ratios; 0.2c equal to or less than 0.6c; beta A equal to or less than 7, A tan Lambda sub 1/2 equal to or less than 6; inviscid supersonic airflow; and zero lift. Author

N75-30095+ Engineering Sciences Data Unit, London (England).
PERFORMANCE DATA FOR THE CRITICAL OPERATION OF NOMINALLY TWO-DIMENSIONAL DOUBLE-RAMP SUPERSONIC INTAKES
Jun. 1975 40 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-75005) Copyright. Avail: NTIS HC $290.50

Data on the performance of nominally two-dimensional double-ramp supersonic intakes are provided for use in initial estimation of performance of supersonic aircraft engine air intakes. The data are applicable for intake design Mach numbers from 2.0 to 2.8, for first ramp inclination of 6 to 12 deg, for free stream Mach numbers from 1.6 to design value, in inviscid flow. Author

N75-30096+ Engineering Sciences Data Unit, London (England).
FREQUENCIES OF VERTICAL AND LATERAL LOAD FACTORS RESULTING FROM GROUND MANOEUVRES OF AIRCRAFT
Jul. 1975 11 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-75008) Avail: NTIS HC $74.50

Data on the magnitude and frequency of occurrence of vertical and lateral load factors resulting from ground maneuvers of fixed wing aircraft are provided for estimating loads on aircraft undercarriages, structure, etc., occurring during ground operations. The data are applicable to all types of fixed wing aircraft operating from paved runways and taxiways, during all phases of ground operations. Author

N75-30097+ Engineering Sciences Data Unit, London (England).
INFORMATION ON THE USE OF DATA ITEMS ON FLAPS INCLUDING ESTIMATION OF THE EFFECT OF FUSELAGE INTERFERENCE
Jul. 1975 7 p refs Supersedes Aero-F.00.01.00 Sponsored by Roy. Aeron. Soc.
(ESDU-75013) Copyright. Avail: NTIS HC $36.00

The use of the flap series, which deals with changes in lift, pitching moment, and drag of a wing due to the deflection of trailing edge flaps is reviewed for slotted, plain, and split type flaps. The lift coefficient increment, pitching moment coefficient increment, drag coefficient increment at zero lift are analyzed along with lift-dependent drag. Means for estimating the fuselage interference effects due to deflection of trailing-edge flap on a wing in isolation are also presented. F.O.S.

N75-30098+ Lyon Univ. (France). Lab. de Mecanique des Fluides.
INFLUENCE OF DISSIPATIVE PHENOMENA ON TURBOMACHINE PERFORMANCE Final Report [INFLUENCE DES PHENOMENES DISSIPATIFS SUR LES PERFORMANCES DES TURBOMACHINES]
Jean Mathieu and G. Spettel 1 Oct. 1974 14 p refs In FRENCH
(Contract DGRST-69-0-1964)
Avail: NTIS HC $3.25

Problems concerning the construction and testing of a wind tunnel for turbomachine plane blades are reviewed. The tests performed are outlined with regard to boundary layer flow stalling and losses due to secondary flow. Results are compared to various computation methods using either the differential approach or the integral approach. ESRO

N75-30099*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPROXIMATE METHOD FOR CALCULATING TRANSONIC FLOW ABOUT LIFTING WING-BODY CONFIGURATIONS: COMPUTER PROGRAM AND USER'S MANUAL
Richard W. Barnwell and Ruby M. Davis Aug. 1975 135 p refs
(NASA-TM-X-72758) Avail: NTIS HC $3.75 CSCL 01A

A user's manual is presented for a computer program which calculates inviscid flow about lifting configurations in the free-stream Mach-number range from zero to low supersonic. Angles of attack of the order of the configuration thickness-length ratio and less can be calculated. An approximate formulation was used which accounts for shock waves, leading-edge separation and wind-tunnel wall effects. Author

N75-30100*# Texas A&M Univ., College Station.
TRANSONIC AIRFOIL FLOWFIELD ANALYSIS USING CARTESIAN COORDINATES Final Report
Leland A. Carlson Washington NASA Aug. 1975 33 p refs (Grant NGR-44-001-157)
(NASA-CR-2577) Avail: NTIS HC $3.75 CSCL 01A

A numerical technique for analyzing transonic airfoils is presented. The method employs the basic features of Jameson's iterative solution for the full potential equation, except that Cartesian coordinates are used rather than a grid which fits the airfoil, such as the conformal circle-plane or 'sheared parabolic' coordinates which were used previously. Comparison with previous results shows that it is not necessary to match the computational grid to the airfoil surface, and that accurate results can be obtained with a Cartesian grid for lifting supercritical airfoils. Author

N75-30101*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMPLIFIED LIFTING-SURFACE THEORY FOR FLAPS ON WINGS OF LOW AND MODERATE ASPECT RATIOS
Bradford H. Wick Washington Sep. 1975 9 p refs
(NASA-TN-D-8060; A-6108) Avail: NTIS HC $3.25 CSCL 01A

A modification of the simplified lifting-surface theory for wings with deflected flaps is presented and evaluated. The modification

is simple and straightforward in application, and is shown to overcome the deficiency in the theory that results in an underestimation of flap lift effectiveness for wings that have low or moderate aspect ratios. Author

N75-30102*# Computer Sciences Corp., Hampton, Va.
THREE-DIMENSIONAL DYNAMICS OF SCIENTIFIC BALLOON SYSTEMS IN RESPONSE TO SUDDEN GUST LOADINGS
Daniel R. Dorsey, Jr. [1975] 133 p
(Contract NAS1-12527)
(NASA-CR-132701) Avail: NTIS HC $5.75 CSCL 01A

A mathematical model was developed of the three-dimensional dynamics of a high-altitude scientific research balloon system perturbed from its equilibrium configuration by an arbitrary gust loading. The platform is modelled as a system of four coupled pendula, and the equations of motion were developed in the Lagrangian formalism assuming a small-angle approximation. Three-dimensional pendulation, torsion, and precessional motion due to Coriolis forces are considered. Aerodynamic and viscous damping effects on the pendulatory and torsional motions are included. A general model of the gust field incident upon the balloon system was developed. The digital computer simulation program is described, and a guide to its use is given. Author

N75-30103*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECTS OF SPANWISE BLOWING ON THE PRESSURE FIELD AND VORTEX-LIFT CHARACTERISTICS OF A 44 DEG SWEPT TRAPEZOIDAL WING
James F. Campbell Washington Jun. 1975 141 p refs
(NASA-TN-D-7907; L-10047) Avail: NTIS HC $5.75 CSCL 01A

Wind-tunnel data were obtained at a free-stream Mach number of 0.26 for a range of model angle of attack, jet thrust coefficient, and jet location. Results of this study show that the sectional effects to spanwise blowing are strongly dependent on angle of attack, jet thrust coefficient, and span location; the largest effects occur at the highest angles of attack and thrust coefficients and on the inboard portion of the wing. Full vortex lift was achieved at the inboard span station with a small blowing rate, but successively higher blowing rates were necessary to achieve full vortex lift at increased span distances. It is shown that spanwise blowing increases lift throughout the angle-of-attack range, delays wing stall to higher angles of attack, and improves the induced-drag polars. The leading-edge suction analogy can be used to estimate the section and total lifts resulting from spanwise blowing. Author

N75-30104*# Boeing Commercial Airplane Co., Seattle, Wash.
PREDICTION OF UNSTEADY AERODYNAMIC LOADINGS CAUSED BY LEADING EDGE AND TRAILING EDGE CONTROL SURFACE MOTIONS IN SUBSONIC COMPRESSIBLE FLOW: ANALYSIS AND RESULTS Final Report
W. S. Rowe, M. C. Redman, F. E. Ehlers, and J. D. Sebastian Washington NASA Aug. 1975 154 p refs
(Contract NAS1-12020)
(NASA-CR-2543) Avail: NTIS HC $6.25 CSCL 01A

A theoretical analysis and computer program was developed for the prediction of unsteady lifting surface loadings caused by motions of leading edge and trailing edge control surfaces having sealed gaps. The final form of the downwash integral equation was formulated by isolating the singularities from the nonsingular terms and using a preferred solution process to remove and evaluate the downwash discontinuities in a systematic manner. Comparisons of theoretical and experimental pressure data are made for several control surface configurations. The comparisons indicate that reasonably accurate theoretical pressure distributions and generalized forces may be obtained for a wide variety of control surface configurations. Spanwise symmetry or antisymmetry of motion, and up to six control surfaces on each half span can be accommodated. Author

N75-30105*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
THEORY OF AN AIRFOIL EQUIPPED WITH A JET FLAP UNDER LOW-SPEED FLIGHT CONDITIONS Final Report
F. L. Addessio and J. G. Skifstad Washington NASA Jul. 1975 141 p refs
(Grant NGL-15-005-094)
(NASA-CR-2571) Avail: NTIS HC $5.75 CSCL 01A

A theory is developed, for the inviscid, incompressible flow past a thin airfoil equipped with a thin, part-span jet flap, by treating the induced flowfields of the jet and the wing separately and by obtaining the fully coupled solution in an iterative manner. Spanwise variation of the jet vortex strength is assumed to be elliptical in the analysis. Since the method considers the vorticity associated with the jet to be positioned on the computed locus of the jet, the downwash aft of the wing is evaluated as well as forces and moments on the wing. A lifting-surface theory is incorporated for the aerodynamics of the wing. Computational results are presented for a rectangular wing at momentum coefficients above 2.0 and compared with existing linear theories and experimental data. Good agreement is found for small angles of attack, jet-deflection angles, and jet-momentum coefficients where the linear theories and experimental data are applicable. Downwash data at a point in the vicinity of a control surface, the load distribution on the airfoil, and the jet, and the jet location are also presented for representative flight conditons. Author

N75-30106# Advisory Group for Aerospace Research and Development, Paris (France).
VORTEX WAKES OF CONVENTIONAL AIRCRAFT
Coleman duP. Donaldson (Aeron, Res. Assoc. of Princeton, Inc., N. J.), Alan J. Bilanin (Aeron. Res. Assoc. of Princeton, Inc., N. J.), and R. H. Korkegi, ed. (ARL) May 1975 85 p refs
(AGARD-AG-204) Avail: NTIS HC $4.75

The present state of knowledge of vortex wakes of conventional aircraft is presented. Topics discussed include roll-up of trailed vorticity, aircraft wake geometry, sinusoidal instability and vortex breakdown, aging of vortices, persistance of vortices in the atmosphere, and aircraft design techniques to minimize wake hazard. Author

N75-30107*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
LOW SPEED WIND TUNNEL INVESTIGATION OF A LARGE-SCALE ADVANCED ARROW WING SUPERSONIC TRANSPORT CONFIGURATION WITH ENGINES MOUNTED ABOVE THE WING FOR UPPER-SURFACE BLOWING
An Early Domestic Dissemination Report
James P. Shivers, H. Clyde McLemore, and Paul L. Coe, Jr. Aug. 1975 69 p refs
(NASA-TM-X-72761) Avail: NASA Industrial Application Centers only to U.S. Requestors: HC $4.25/MF $2.25 CSCL 01A

Tests were conducted in the Langley full scale tunnel to determine the low speed aerodynamic characteristics of a large scale advanced arrow-wing supersonic transport configuration with engines mounted above the wing for upper surface blowing. Configuration variables included trailing edge flap deflection, engine jet nozzle angle, engine thrust coefficient, engine out operation, and asymmetrical trailing edge BLC for providing roll trim. Downwash measurements at the tail were obtained for different thrust coefficients, tail heights, and at two fuselage stations. Author

N75-30108*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FLOW VISUALIZATION OF LEADING-EDGE VORTEX ENHANCEMENT BY SPANWISE BLOWING
Gary E. Erickson (George Washington Univ.) and James F. Campbell Sep. 1975 108 p refs
(NASA-TM-X-72702) Avail: NTIS HC $5.25 CSCL 01A

Flow visualization studies were conducted in a small pilot wind tunnel to determine qualitative effects of blowing a discrete jet essentially parallel to the leading edge of a 45 deg-swept trapezoidal wing featuring leading- and trailing-edge flaps. Test parameters included wing angle-of-attack, jet momentum coefficient, leading- and trailing-edge flap deflections, and nozzle chordwise displacement. Results of this study indicate that blowing from a reflection plane over the wing enhances the leading-edge vortex and delays vortex bursting to higher angles-of-attack and greater span distances. Increased blowing rates decrease vortex size, growth rate, and vertical displacement above the wing surface at a given span station and also extend the spanwise effectiveness of lateral blowing. Deflection of a leading-edge flap delays the beneficial effects of spanwise blowing to higher

angles-of-attack. Nozzle chordwise locations investigated for the wing with and without leading-edge flap deflection appear equally effective in enhancing the separated leading-edge flow. Author

N75-30109*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FREE-FLIGHT MODEL INVESTIGATION OF A VERTICAL-ATTITUDE VTOL FIGHTER
William A. Newsom, Jr. and Ernie L. Anglin Washington Sep. 1975 34 p refs Technical film supplement L-1186 available on request
(NASA-TN-D-8054; L-10345) Avail: NTIS HC $3.75 CSCL 01C

Tests were made in the Langley full-scale tunnel and included a study of the stability and control characteristics of delta- and swept-wing configurations from hovering through the transition to normal forward flight. Static force tests were also conducted to aid in the analysis of the flight tests. With conventional artificial rate stabilization, very smooth transitions could be made consistently with relatively little difficulty. Because of the lower apparent damping and a tendency to diverge in yaw, however, the swept-wing configuration was considered to be much more difficult to fly than the delta-wing configuration. With rate dampers off, both configurations were very difficult to control and the control power needed for satisfactory flights was substantially higher than with the rate dampers operating. Author

N75-30110# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
LINEARISED SUPERSONIC FLOWS WITH BOUNDARY CONDITIONS SPECIFIED ON TWO CONCENTRIC CYLINDERS
H. Portnoy Jan. 1975 31 p refs
(TAE-239) Avail: NTIS HC $3.75

The theory of linearized supersonic flows with two sets of boundary conditions, specified on coaxial mean cylinders, was developed using operational calculus. The boundary conditions may be either those for tangency at a solid surface (radial velocity component specified) or those appropriate at a jet surface (longitudinal perturbation velocity specified), so that four distinct problems exist. The general nonaxisymmetric cases are considered. Functions are defined for finding pressure coefficients on the solid boundaries, and the shapes of the jet boundaries and the properties of these functions are studied. Author

N75-30111*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A STOL AIRWORTHINESS INVESTIGATION USING A SIMULATION OF AN AUGMENTOR WING TRANSPORT. VOLUME 1: SUMMARY OF RESULTS AND AIRWORTHINESS IMPLICATIONS Final Report
Robert L. Stapleford (Systems Technol., Inc., Mountain View, Calif.), Robert K. Heffley (Systems Technol., Inc., Mountain View, Calif.), Charles S. Hynes, and Barry C. Scott (FAA, Moffett Field, Calif.) Oct. 1974 55 p refs Sponsored in part by FAA (Contract NAS2-7926)
(NASA-TM-X-62395; AD-A005878; FAA-RD-74-179-Vol-1; A-5797-Vol-1) Avail: NTIS HC $4.25 CSCL 01A

A simulator study of STOL airworthiness criteria was conducted using a model of an augmentor wing transport. The approach, flare and landing, go-around, and takeoff phases of flight were investigated. The results are summarized and possible implications with regard to airworthiness criteria are discussed. The results provide a data base for future STOL airworthiness requirements and a preliminary indication of potential problem areas. The results are also compared to the results from an earlier simulation of the Breguet 941S. Where possible, airworthiness criteria are proposed for consideration. Author

N75-30112# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
FORCE MEASUREMENTS ON PARTS OF WIND TUNNEL MODELS
1975 198 p refs In GERMAN; ENGLISH summary Proc. of the Meeting of the DGLR Sci. Comm. 3.4 on Flow Mech. Testing Tech., Bremen, 5 Jun. 1973
(DLR-Mitt-75-02) Avail: NTIS HC $7.00; DFVLR, Cologne DM 69.80

The problem of aerodynamic force measurements was dealt with. Multicomponent strain gaps were used in determining these forces. The measurement of wing and tailplane loads on a semimodel of the European Airbus A 300 B was reported. Interference effects of a slender wing-body configuration were experimentally determined. Hinge moments, rudder, and fin loads of a horizontal tail surface with a rudder were examined. The tail drag of an aircraft was determined in a transonic wind tunnel. Aerodynamic interference forces were analyzed by splitting up a model in several parts. Tail assemblies of missiles were investigated. For individual titles, see N75-30113 through N75-30121.

N75-30113 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Zentralabteilung Niedergeschwindigkeits-Windkanaele.
MEASUREMENT OF WING AND TAILPLANE LOADS ON THE MODEL OF THE EUROPEAN AIRBUS A 300 B [MESSUNG DER FLUEGEL- UND LEITWERKSLASTEN AM HALBMODELL DES EUROPAEISCHEN AIRBUS A 300 B]
W. Baumert and R. Wulf *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 7-21 refs In GERMAN (For availability see N75-30112 21-02)

Strain gage balance force measurements on model parts carried out in low speed wind tunnels at Braunschweig and Goettingen are reported. The test set-up and measuring equipment for a semimodel of the European Airbus A 300 B is detailed. Pressure distribution and force measurements were carried out for the wing and tailplane of this model under simultaneous jet simulation. ESRO

N75-30114 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Stroemungsmechanik.
EXPERIMENTAL DETERMINATION OF INTERFERENCE EFFECTS OF A SLENDER WING-BODY CONFIGURATION [EXPERIMENTELLE BESTIMMUNG VON INTERFERENZEFFEKTEN AN EINER SCHLANKEN FLUEGEL-RUMPF-ANORDNUNG]
W. Schneider *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 25-36 refs In GERMAN (For availability see N75-30112 21-02)

The determination of wing-body interference by strain gage measurement of partial loads is illustrated for a slender body. Present technology allows the construction of wind tunnel balances of small dimensions which enable the determination of partial forces parallel to the global force measurements of wind tunnel models. ESRO

N75-30115 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
MEASUREMENT OF HINGE MOMENTS, RUDDER AND FIN LOADS OF A HORIZONTAL TAIL SURFACE, WITH ONE- AND SIX-COMPONENT STRAIN GAGE BALANCES [MESSUNG VON SCHARNIERMOMENTEN, RUDER- UND FLOSSENLASTEN AN EINEM HOEHENLEITWERK MIT EIN- UND SECHSKOMPONENTEN-DMS-WAAGEN]
J. Krahl *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 37-77 refs In GERMAN (For availability see N75-30112 21-02)

The application of internal strain gage balances to a tail semimodel to determine the partial loads and moments of a horizontal tail surface with a rudder is described. The construction of the model, the design and placing of the balance, the automatic data acquisition and evaluation, as well as some selected results, are briefly described. ESRO

N75-30116 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
DETERMINATION OF AIRCRAFT TAIL DRAG IN THE TRANSONIC WIND TUNNEL FOR SEVERAL TAIL AND NOZZLE SHAPES AND A SIMULATED COLD ENGINE JET [BESTIMMUNG DES FLUGZEUG-HECKWIDERSTANDES IM TS-WINDKANAL MIT VERSCHIEDENEN HECK- UND DUESENFORMEN BEI SIMULIERTEM KALTEN TRIEBWERKSSTRAHL]
H. Braun *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 79-91 In GERMAN (For availability see

N75-30112 21-02)

A test stand for experimentally determining jet aircraft tail drag in a transonic wind tunnel is described. The setup allows interchanging the jet nozzles and provides compressed air for jet exhaust simulation. ESRO

N75-30117 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).

DETERMINATION OF AERODYNAMIC INTERFERENCE FORCES USING THE VFW-FOKKER PARTIAL LOAD METHOD [ERMITTLUNG VON AERODYNAMISCHEN INTERFERENZKRAEFTEN MIT DER VFW-FOKKER-TEILLASTENMETHODE]

B. Ewald *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 93-110 In GERMAN (For availability see N75-30112 21-02)

A partial load method was developed for investigation of interference effects in which the body of the wind tunnel model is split up into separate parts and the aerodynamic forces acting on each part are separately measured. The advantages of this method are: the external contour of the model consists of a simple shell without any measuring equipment, the model interior (central support with balance) can be used for several aircraft geometries, and the results of measurements supply direct information about aerodynamic force distribution and interference behavior. ESRO

N75-30118 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany). Inst. fuer Angewandte Gasdynamik.

FORCE MEASUREMENTS ON TAIL ASSEMBLIES OF MISSILES [UEBER KRAFTMESSUNGEN AN LEITWERKEN VON FLUGKOERPERN]

H. Esch *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 111-129 In GERMAN (For availability see N75-30112 21-02)

Strain gage balances for measuring tail and rudder forces of missile models are described. The models are to be used in the hypersonic regime at stagnation pressures of 1 bar. The fuselage diameter of the models is between 30 and 50 mm. ESRO

N75-30119 National Aerospace Lab., Amsterdam (Netherlands).

SOME NLR EXPERIENCE IN MEASURING AERODYNAMIC LOADS ON WIND TUNNEL MODEL PARTS USING STRAIN GAGE BALANCES [EINIGE NLR-ERFAHRUNGEN MIT DEM MESSEN AERODYNAMISCHER BELASTUNGEN AN WINDKANALMODELLTEILEN MIT HILFE VON DMS-WAAGEN]

T. J. Schoenmakers *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 131-159 In GERMAN (For availability see N75-30112 21-02)

General design principles for strain gage balance load measurements are considered. Separate problems with rudders and similar model parts are explored. Some practical applications are indicated. These include strain gage applications to moment measurement of a semimodel lateral rudder, engine nacelle balance, balances for fins of missile models, and a balance with hydrogen peroxide discharge for an engine model. The accuracy of the measurements is discussed. ESRO

N75-30120 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).

MEASUREMENT OF FORCES AND MOMENTS ON MODEL COMPONENTS USING STRAIN GAGES [MESSUNG VON KRAEFTEN AN MODELLKOMPONENTEN MITTELS DEHNUNGSMESSTREIFEN] **c35**

P. Raab *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 161-179 In GERMAN (For availability see N75-30112 21-02)

Several possibilities of using strain gages in stress tests, multicomponent balances and partial force balances, for measuring static and dynamic loads are reported. The selection of strain gage type, bridge type, adhesives etc., is discussed, and the accuracy of results is mentioned. ESRO

N75-30121 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Inst. fuer Stroemungsmechanik.

MISSILE MODEL HINGE MOMENT MEASUREMENT [SCHARNIERMOMENTENMESSUNG AN EINEN FLUGKOERPERMODELL]

A. Heddergott and W. Schamel (MBB, Ottobrunn, West Ger.) *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 181-195 In GERMAN (For availability see N75-30112 21-02)

A strain gage balance is described which permits measurement of the rudder hinge moment of a guided missile. Construction and calibration as well as results obtained (reproducibility) are discussed. The possibility of measuring other force components is indicated. ESRO

N75-30122# Naval Postgraduate School, Monterey, Calif.

VALIDATION OF THE NONLINEAR SIX DEGREE OF FREEDOM MATHEMATICAL MODEL OF THE XR-3 CAPTURED AIR BUBBLE SURFACE EFFECT SHIP IN CALM WATER M.S. Thesis

George Thomas Forbes Dec. 1974 131 p refs

(AD-A005868) Avail: NTIS CSCL 13/10

The non-linear, six-degree-of-freedom, mathematical model of the XR-3 captured air bubble surface effect ship is validated by comparison of measured testcraft performance with computed variables in the digital computer simulation. Data processing methods implemented on hybrid and digital computers are presented. Improvements are made on the structure of the mathematical model of the XR-3 by program subroutine modifications and justification is given for the changes made. Close agreement is obtained between measured and computer simulated variables over a variety of operating conditions in calm water. GRA

N75-30123# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AERODYNAMIC COEFFICIENTS OF BODY, WHICH FLIES IN THE ENVIRONMENT OF ANOTHER BODY IN FREE MOLECULAR FLOW

M. A. Zakirov 26 Feb. 1975 23 p refs Transl. into ENGLISH from Tsentr. Aerogidrodinamicheskii Inst. Uch. Zap. (USSR), v. 3, no. 3, 1972 p 122-126

(AD-A008763; FTD-MT-24-0335-75) Avail: NTIS CSCL 20/4

The Monte Carlo method was used to calculate the aerodynamic coefficients of simplest bodies (spheres, cones, and cylinders of infinite length) which flow together and after each other at certain distances. Approximation formulas were obtained which match well with the results of the Monte Carlo calculations. M.J.S.

N75-30124# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FLOW OF SUPERSONIC FLOW ABOUT THE CIRCULAR OF IDEAL GAS

V. I. Blagosklonov and A. N. Minailos 26 Feb. 1975 19 p refs Transl. into ENGLISH from Uch. Zap., Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 3, no. 2, 1972 p 130-134

(AD-A008766; FTD-MT-24-0413-75) Avail: NTIS CSCL 20/4

The Results are presented of a numerical analysis of flow fields around a cylinder. Author

N75-30125# Texas A&M Univ., College Station.

AERODYNAMIC THEORY FOR A CASCADE OF OSCILLATING AIRFOILS IN COMPRESSIBLE SUBSONIC FLOW Interim Report, 1 Jul. - 31 Dec. 1974

W. P. Jones and Jimmie A. Moore Feb. 1975 36 p refs

(Grant AF-AFOSR-2700-74; AF Proj. 9781)

(AD-A008890; TEES-3068-75-01; AFOSR-75-0475TR) Avail: NTIS CSCL 20/4

A simple numerical technique is developed for determining the airload coefficients on a typical airfoil of the cascade. The effects of varying airfoil spacing, frequency, Mach number and phase difference between adjacent blades are investigated. In particular, the variations in the aerodynamic damping for pure vertical translational and pitching motions are considered. It is shown that translational damping can become zero but never negative at certain discrete frequencies. Furthermore, the results indicate that the pitching moment aerodynamic damping referred to the quarter-chord axis, while also being zero at the critical frequencies, can be negative at the higher Mach numbers over a wide range of frequencies of interest in flutter analysis. The

effects of varying the stagger angle of the cascade are not considered in the present paper. GRA

N75-30126# Hydronautics, Inc., Laurel, Md.
THE PRESSURE FIELD OF A VORTEX WAKE IN GROUND EFFECT
Clinton E. Brown 1975 9 p refs
(Contract F44620-71-C-0080; AF Proj. 9781)
(AD-A008857; AFOSR-75-0495TR) Avail: NTIS CSCL 01/1

The ground pressures under a descending pair of vortices, such as might be generated by aircraft either landing or taking off are computed. It is found that as the vortices first approach the ground, only positive pressures are produced; however as the descent continues the high velocity field of the vortices makes itself apparent in dips to sub-atmospheric pressure which lie closely beneath the vortex center. Nevertheless, a substantial positive pressure hill precedes the path of the vortex as it moves laterally in the ground effect. The level of pressures produced is dependent only on the flight speed, lift coefficient and aspect ratio while the length scale of the pressure distribution is proportional to the span. These results may be useful in the development of systems to monitor multiple aircraft take-off and/or landing operations. GRA

N75-30127# Naval Underwater Systems Center, Newport, R.I.
THEORETICAL AND EXPERIMENTAL VELOCITIES OF FREE-FALLING SPHERES IN A STRATIFIED ATMOSPHERE
Barry E. Wall 19 Mar. 1975 30 p refs
(SF33313235)
(AD-A009090; NUSC-TR-4676) Avail: NTIS CSCL 20/4

An important factor in the sound produced by an object impacting the water surface is the impact velocity of the object. A series of tests was conducted at the Atlantic Undersea Test and Evaluation Center (AUTEC) to determine the free-fall impact velocity of various size and weight spheres. The experimental data were then compared with the predictions of a mathematical model, which calculated impact velocities based on the drag coefficient, Reynolds number, drop altitude, and physical characteristics of the sphere and the atmosphere. After some modifications were made to the drag coefficient-versus-Reynolds number curve, good correlation was obtained between the experimental and calculated impact velocities. GRA

N75-30128# Army Missile Research, Development and Engineering Lab., Redstone Arsenal, Ala.
ROTOR DOWNWASH VELOCITIES ABOUT THE UH-1M HELICOPTER: FLIGHT TEST MEASUREMENTS AND THEORETICAL CALCULATIONS
B. Z. Jenkins and A. S. Marks 1 Jan. 1975 108 p refs
(DA Proj. 1M2-62303-A-214)
(AD-A008965; RD-75-27) Avail: NTIS CSCL 01/1

Downwash velocity data from a flight test of the UH-1M helicopter are presented in comparison with calculated values. Hot film anenometers were used to measure flow velocities at five points in the downwash for a variety of aircraft forward velocities and hover. The theoretical predictions were made using a mathematical model of sources and sinks to simulate the fuselage and vortex filaments to simulate the rotor wake. Problems peculiar to the flight test are discussed. GRA

N75-30129# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF DISCRETE EDDY ZONES FOR THE CALCULATION OF THE COMPONENTS THE TIME AVERAGE INDUCTIVE VELOCITY OF A HEAVILY LOADED PROPELLER
E. D. Safronov 20 Feb. 1975 37 p refs Transl. into ENGLISH from Uch. Zap. Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 3, no. 3, 1972 p 45-53
(AD-A008732; FTD-MT-24-0327-75) Avail: NTIS CSCL 01/1

Discrete vortex eddy belt zones are set up to determine the time average speed of an axial flow heavily loaded screw propeller. Data show experimental and calculated values agree well with each other. A solution was given to the problem of motion velocity for the free vorticity layer of the propeller. E.H.W.

N75-30130# Aerospace Systems, Inc., Burlington, Mass.
A STUDY OF TECHNIQUES FOR REAL-TIME, ON-LINE OPTIMUM FLIGHT PATH CONTROL. ALGORITHMS FOR THREE-DIMENSIONAL, MINIMUM-TIME FLIGHT PATHS WITH TWO STATE VARIABLES Final Report, Dec. 1973 - Nov. 1974
Arthur E. Bryson, J. Karl Hedrick, and William C. Hoffman Dec. 1974 35 p refs
(Contract F44620-72-C-0001; AF Proj. 9769)
(AD-A008983; ASI-TR-74-20; AFOSR-75-0585TR) Avail: NTIS CSCL 01/2

Study of three-dimensional, minimum-time turning maneuvers for supersonic fighter aircraft is described. An optimization algorithm is developed for computing the minimum-time paths for specified initial energy, final energy, and heading change. For turns which do not specify the final position, the optimum maneuvers comprise a one-parameter family of flight paths. All the optimum turns and their associated control variables can be presented in simple graphical form for a specified aircraft configuration. A feedback control diagram can be easily implemented in the airborne computer to provide real-time, on-line optimal flight path control. The numerical optimization required can be simplified to such an extent that the feedback charts could be updated on-board for aircraft configuration changes and atmospheric variations. Flow charts of the optimization algorithm are presented along with numerical results for an early model of the F-4 fighter. GRA

N75-30131# Borst (Henry V.) and Associates, Wayne, Pa.
FLUID DYNAMIC LIFT, CONTENT SUMMARY Final Technical Report
Henry V. Borst 30 Apr. 1975 8 p refs
(Contract N00014-73-C-0354)
(AD-A009103; A001AG) Avail: NTIS CSCL 01/1

The background and methods used in preparing and completing the remaining chapters for the book Fluid Dynamic Lift are discussed. This book, started by Dr. Hoerner, is a logical follow-on to the book Fluid-Dynamic Drag and covers the factors involving lift in the same manner as was done in the drag book. The chapters completed are discussed and major topics covered are given. GRA

N75-30084 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE EFFECT OF CURVATURE DISCONTINUITIES ON THE SUPERSONIC FLOW PAST AXISYMMETRIC BLUNT BODIES
D. Eckert *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 21 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

N75-30092 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE WEDGE ANGLE OF LAMINAR SEPARATION BUBBLES
F. X. Wortmann *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 13 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-30082 21-01)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N75-30132* National Aeronautics and Space Administration. Pasadena Office, Calif.
SATELLITE AIDED VEHICLE AVOIDANCE SYSTEM Patent
Ernest R. Steele, inventor (to NASA) Issued 19 Aug. 1975 11 p Filed 21 Jan. 1972
(NASA-Case-ERC-10419-1; US-Patent-3,900,847; US-Patent-Appl-SN-219722; US-Patent-Class-343-6.5R;

US-Patent-Class-343-112CA) Avail: US Patent Office CSCL 17G

An improved satellite aided vehicle avoidance system is described. The exact range from a protected vehicle to an intruding vehicle with mutual collision heading and velocity is derived without signal transmission by the protected vehicle or use of synchronized time reference devices by a repeated series of signals broadcast from a satellite to all participating vehicles. An improved, reliable, and cost effective system is provided for aiding a vehicle operator to avoid collision with intruding aircraft.
Official Gazette of the U.S. Patent Office

N75-30133# National Transportation Safety Board, Washington, D.C. Bureau of Aviation Safety.
A PRELIMINARY ANALYSIS OF AIRCRAFT ACCIDENT DATA, US CIVIL AVIATION, 1974 Special Study Report, 1974
26 Feb. 1975 53 p
(PB-240915/9; NTSB-APA-75-1) Avail: NTIS HC $4.25 CSCL 01B

A preliminary record is presented of aircraft accidents which occurred in U.S. Civil Aviation Operations during calendar year 1974. It includes a statistical recapitulation of all accidents; a comparison of accidents, fatalities, accident rates, and growth changes in 1974 with comparable data for the previous 5-year period; summary tables; and a brief of each air carrier accident for which a cause has been determined. GRA

N75-30134# Neilsen Engineering and Research, Inc., Mountain View, Calif.
EXTENSION OF THE METHOD FOR PREDICTING SIX DEGREE OF FREEDOM STORE SEPARATION TRAJECTORIES AT SPEEDS UP TO THE CRITICAL SPEED TO INCLUDE A FUSELAGE WITH NONCIRCULAR CROSS SECTION. VOLUME 2: USER'S MANUAL FOR THE COMPUTER PROGRAMS Final Report, May 1972 - Aug. 1974
Frederick K. Goodwin and Marnix F. E. Dillenius Nov. 1974 306 p refs
(Contract F33615-72-C-1375; AF Proj. 8219)
(AD-A006158; NEAR-TR-65-Vol-2; AFFDL-TR-74-130-Vol-2) Avail: NTIS CSCL 01/3

Detailed instructions are presented for using two computer programs which calculate the six-degree-of-freedom trajectories of external stores which are separated from fighter-bomber type aircraft at speeds up to the critical speed. Single and multiple store configurations can be handled by the programs. The first program calculates the source distributions which represent the volume distributions of the fuselage, store(s), and ejector rack if one is present. The second program uses a lifting-surface theory to determine a vorticity distribution which represents the wing and pylon loading and calculates the trajectory of the ejected store. This report describes the two programs, presents instructions for preparing input for the programs, describes the output from each program, and presents sample cases. GRA

N75-30135# Air Force Weapons Lab., Kirtland AFB, N.Mex.
THE APPLICATION OF PROBABILITY CALCULATIONS FOR BIRD AIRCRAFT STRIKE ANALYSES AND PREDICTIONS USING RADAR Final Report, Mar. - May 1974
George E. Meyer Mar. 1975 20 p refs
(AF Proj. 2103)
(AD-A008901; AFWL-TR-74-145) Avail: NTIS CSCL 01/2

A theoretical development is given for the calculation of binomial probability distribution functions for assessing the risk of bird hazards to aircraft using radar. A set of airspace cells is defined by beam geometry and pulse width and a given aircraft flight path, each with a determined number of birds. Each distribution function can be studied to determine the maximum risk and corresponding number of birds involved. The accumulative probability of bird strikes over an entire route can be determined by calculating the union of discrete cell probability sets. GRA

N75-30136# Oakland Univ., Rochester, Mich. Dept. of Psychology.
REDUCTION OF THE BAT HAZARD TO RANDOLPH AFB AIRCRAFT AFWL/AFOSR CONTRACT NO. 73-187 Final Report, 10 Jul. 1973 - 10 Jan. 1975
Leonard C. Ireland, Victor A. Harris, Sharon S. Ireland, Timothy C. Williams, and Janet M. Williams 10 Jan. 1975 63 p refs Prepared in cooperation with State Univ. of New York, Buffalo (Grant AF-AFOSR-2554-73)
(AD-A008972; AFOSR-75-0586TR) Avail: NTIS CSCL 01/2

The airborne behavior of T. b. Mexicana emerging from and returning to the Bracken cave near Randolph AFB was observed with both search and height-finding radars. Radar echoes from dense groups of bats covered areas as large as 1,500 square kilometers and rose to altitudes of over 3,000 meters. Evening bat flights appeared to have three distinct phases of development: exit from the roost and ascent, transition to level flight, and dispersal. In the dispersal phase, the bats usually traveled directly toward Randolph AFB. A bat avoidance program, based on real time radar observations, was initiated at Randolph AFB during the summer of 1971 and continued through 1974. Since the start of the program, the frequency of engine damage has decreased. It appears possible to predict nights when bat strikes are most likely to occur 24 hours in advance. Strobe lights were found to be an ineffective bat deterrent. GRA

N75-30058 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
REQUIREMENTS FOR OPERATION OF LIGHT HELICOPTERS AT NIGHT AND IN POOR VISIBILITY
M. Rade *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 12 p refs (For availability see N75-30052 21-01)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N75-30137*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE 4D AREA NAVIGATION SYSTEM DESCRIPTION AND FLIGHT TEST RESULTS
Homer Q. Lee, Frank Neuman, and Gordon H. Hardy Washington Aug. 1975 59 p refs
(NASA-TN-D-7874; A-5788) Avail: NTIS HC $4.25 CSCL 17G

A 4D area navigation system was designed to guide aircraft along a prespecified flight path (reference path) such that the aircraft would arrive at the approach gate at a time specified by the ATC controller. Key components to achieve this requirement were: (1) stored reference trajectories; (2) a continuously recomputed capture trajectory to a selected waypoint on the reference trajectory so as to achieve the desired time of arrival; (3) electronic situation displays; and (4) a control system to follow the overall trajectory in space and time. The system was implemented in a digital integrated avionics system (STOLAND) installed on a CV-340 airplane. Although the 4D system was designed primarily for automatic operation, it was flight tested in a flight director mode (the pilot follows the flight director commands), because the CV-340 autopilot servos were not tied to the avionics system. The flight test showed that, even in the flight director mode, the pilot did achieve the objectives of path tracking and time of arrival control with only moderate workload. The system also permitted controlled delay of the time of arrival by path stretching, which takes advantage of the continuously changing capture trajectory to predict the time of arrival. Simulations in the automatic and manual modes were used to complement the flight data. Author

N75-30138*# Kanner (Leo) Associates, Redwood City, Calif.
THE LOGNORMAL FREQUENCY DISTRIBUTION OF A RANDOM DATA FLOW
H. P. Englmeier Washington NASA Aug. 1975 12 p refs Transl. into ENGLISH from Nachrichtentech. Z. (West Germany), v. 28, Apr. 1975 p 115-118

(Contract NASw-2790)
(NASA-TT-F-16515) Avail: NTIS HC $3.25 CSCL 17G

Air traffic is simulated by a complex data processing system consisting of an air traffic simulator and the pilot system. The information inputs and outputs of the pilot-operator system are recorded and analyzed to obtain information concerning the data flow between the simulator and the pilot system which might lead to propositions with general applicability for air traffic control. It is found that the analyzed data flow is not based upon any systematic causes, is subject to random distribution, and is a function of human factors. Author

N75-30139# Grumman Aerospace Corp., Calverton, N.Y.
THE APPLICATION OF DME POSITIONING TECHNOLOGY TO FLIGHT TESTING
Roy W. Latham [1975] 8 p refs
Avail: NTIS HC $3.25

An extensive system of distance measuring equipment (DME) ground stations is maintained as part of the standard system of radio aids to navigation. By using three or more DME stations selected in sequence, and processing the sequence of range measurements with a polynomial or Kalman filter, aircraft position can be determined to an accuracy of about twenty meters. The accuracy and widespread availability of DME suggests potential application to the flight testing of navigation, weapons, and electronic countermeasures systems. A multi-DME system was developed which places a modified airborne DME interrogator under the control of a minicomputer, with aircraft position and velocity computed in real time. Author

N75-30140# Facility Checking Squadron (1866th) (AFCS), Richards-Gebaur AFB, Mo.
TRACALS EVALUATION REPORT, TACAN SPECIAL EVALUATION REPORT, NIAGARA FALLS IAP, NEW YORK
Geoffry S. Howard Oct. 1974 77 p
(AD-A006141; Rept-74/66T/22) Avail: NTIS CSCL 17/7

The report contains the results of the AN/GRN-20B TACAN special evaluation at Niagara Falls International Airport, N.Y., conducted during the period 23 September to 3 October 1974. Ground evaluation results describe maintenance actions taken to prepare the facility for the flight evaluation. The problems of unreliable commercial power and a high antenna failure rate are also discussed. A history of the facility is included. Flight evaluation results include the results of coverage checks, interference field investigations, normal and low power comparisons, course structure, and the TACAN periodic flight inspection. Taken together, the ground and the flight evaluation results fully define the capabilities and limitations of the TACAN. The data presented in this report can be used as a valid guide to anticipated performance until there is a significant change in the ground equipment or until a change occurs in the horizon screening. GRA

N75-30141# Exxon International Co., New York. Tanker Dept.
SPERRY CAS COLLISION AVOIDANCE SYSTEM Final Report, Dec. 1973 - Dec. 1974
R. C. Uhlin Dec. 1974 13 p ref
(Contract MA-1-35049)
(COM-75-10372/1; EIC.27TMR.74; MA-RD-920-75049) Avail: NTIS HC $3.25 CSCL 17G

This report covers the evaluation of the Sperry collision avoidance system aboard the EXXON Baton Rouge during a test period of six months. A description of the system and a brief outline of the unique data presentation is also provided and the operation, ease of use and reliability is assessed. Performance and operational features have been rated and compared with several other systems previously evaluated and the report confirms this system gives a high level of information in tracking up to 20 targets. GRA

N75-30142# Syracuse Univ., N.Y. Dept. of Electrical and Computer Engineering.
AN APPROACH FOR THE DESIGN OF AN AIR TRAFFIC CONTROL SYSTEM Interim Report, Aug. 1972 - Nov. 1974
Sun-Maw Yang and Tse-Yun Feng Mar. 1975 199 p refs
(Contract F30602-72-C-0281)
(AD-A008795; TR-73-14; RADC-TR-75-64) Avail: NTIS CSCL 17/7

Sophisticated air traffic control systems (ATCS) are becoming more and more urgently needed to accommodate increasing air traffic service demands and to resolve the various problems caused by such demands. The goals of ATCS and the interrelations between them are delineated. A generalized approach for the ATCS design is proposed so that further improvements on the ATCS is possible by more precisely modeling the craft capability, adding the new facilities in airports, in aircrafts and in control towers, and providing more information about many uncertain factors, such as noises, errors, etc. into consideration. Purifying the data of aircrafts and generating crafts-situation-regulation commands are two major information processings done by ATCS, from which most of the goals of ATCS are to be achieved. GRA

N75-30143# Honeywell, Inc., St. Petersburg, Fla. Aerospace Div.
AUTONOMOUS NAVIGATION TECHNOLOGY. PHASE 1A: STUDY Final Report, 15 Mar. 1973 - 1 Aug. 1974
D. C. Paulson 1 Mar. 1975 333 p refs
(Contract F07401-73-C-0220)
(AD-A008649; Rept-3811-FR1; SAMSO-TR-74-221) Avail: NTIS CSCL 17/7

The program objective has been to provide the design of a space navigation system for unmanned earth satellites. The system is required to provide accurate determination of the ephemeris state and to be autonomous. The equations of motion of the satellite are integrated using a detailed model of the earth's gravitational field. The effects of residual errors in the gravity field, unmodeled forces, and uncertainties in initial conditions are reduced by measurements. The selected approach employs two down sensors to track unidentified earth landmarks surface; this unknown tracking method obtains to line of sight angular velocity (V/h). The Phase I objective was to design and test an engineering model down sensor, a strapdown telescope. The measurement is obtained by digital correlation of signals from photodetector arrays in its image plane. GRA

N75-30072 Standard Electrik Lorenz A.G., Stuttgart (West Germany).
NEW RADIO NAVIGATION AIDS BASED ON TACAN PRINCIPLES
M. Boehm and E. Coors *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 22 p (For availability see N75-30052 21-01)

N75-30073 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A GUIDANCE SYSTEM FOR FIXED OR ROTARY WING AIRCRAFT IN APPROACH AND LANDING ZONES
Jean Besson *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs In FRENCH; ENGLISH summary (For availability see N75-30052 21-01)

N75-30076 Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
DEVELOPMENTAL MICRON LABORATORY TEST RESULTS
Robert R. Warzynski and George C. Radic *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 3 p (For availability see N75-30052 21-01)

N75-30081 Naval Air Test Center, Patuxent River, Md. Flight Test Div.
US NAVY VTOL AUTOMATIC LANDING SYSTEM DEVELOPMENT PROGRAM
Robert S. Buffum, Richard W. Huff, and Gerald L. Keyser *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p (For availability see N75-30052 21-01)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N75-30144 Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
PUMA ENGINE POWER CHECKING USING COLLECTIVE PITCH
I. A. Fisher and T. Opatowski 17 May 1973 30 p refs
(AAEE/Note-2081; BR35625) Avail: Issuing Activity

A theory is presented which shows how the power output from a Turmo 3, C4 engine in a Puma helicopter can be expressed in terms of collective pitch for level flight at 30 kt indicated airspeed. It is shown how this could provide the basis for checking the power output of Puma engines in service tests. Results indicate that the method proposed may just be accurate enough to detect a 4 percent deterioration in power output. ESRO

N75-30145*# Boeing Vertol Co., Philadelphia, Pa.
CONCEPTUAL DESIGN STUDY OF A 1985 COMMERCIAL STOL TILT ROTOR TRANSPORT
C. A. Widdison, J. P. Magee, and H. R. Alexander Nov. 1974 256 p refs
(Contract NAS2-8048)
(NASA-CR-137601; D210-10873-1) Avail: NTIS HC $8.50 CSCL 01C

Results of conceptual engineering design studies of a STOL tilt rotor commercial aircraft for the 1985 time frame are presented. The details of aircraft size, performance, flying qualities, noise, and cost are included. The savings in terms of fuel economy resulting from STOL operations compared with VTOL vehicles are determined. Author

N75-30146*# Boeing Vertol Co., Philadelphia, Pa.
CONCEPTUAL DESIGN STUDIES OF 1985 COMMERCIAL VTOL TRANSPORTS THAT UTILIZED ROTORS, VOLUME 1
J. P. Magee, R. Clark, and H. R. Alexander Nov. 1974 459 p refs
(Contract NAS2-8048)
(NASA-CR-137599; D210-10858-1) Avail: NTIS HC $11.50 CSCL 01C

Results of conceptual design studies of commercial rotary wing transport aircraft for the 1985 time period are presented. Two aircraft configurations, a tandem helicopter and a tilt rotor, were designed for a 200 nautical mile short haul mission with an upper limit of 100 passengers. In addition to the baseline aircraft two further designs of each configuration are included to assess the impact of external noise design criteria on the aircraft size, weight, and cost. Author

N75-30147*# Boeing Vertol Co., Philadelphia, Pa.
CONCEPTUAL DESIGN STUDIES OF 1985 COMMERCIAL VTOL TRANSPORTS THAT UTILIZED ROTORS, VOLUME 2
J. P. Magee, R. Clark, and H. Alexander Nov. 1974 407 p refs
(Contract NAS2-8048)
(NASA-CR-137600; D210-10858-2) Avail: NTIS HC $10.50 CSCL 01C

Results of conceptual design studies of tilt rotor and tandem helicopter aircraft for a 200 nautical mile commercial short haul transport mission are presented. The trade study data used in selecting the design point aircraft and technology details necessary to support the design conclusions are included. Author

N75-30148*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
HUMAN COMFORT RESPONSE TO RANDOM MOTIONS WITH A DOMINANT TRANSVERSE MOTION
Ralph W. Stone, Jr. May 1975 94 p refs
(NASA-TM-X-72694) Avail: NTIS HC $4.75 CSCL 05E

Subjective ride comfort response ratings were measured on the Langley Visual Motion Simulator with transverse acceleration inputs with various power spectra shapes and magnitudes. The results show only little influence of spectra shape on comfort response. The effects of magnitude on comfort response indicate the applicability of psychophysical precepts for comfort modeling. Author

N75-30149# Army Aviation Systems Command, St. Louis, Mo.
MAJOR ITEM SPECIAL STUDY (MISS), UH-1H MAIN MAST ASSEMBLY Interim Report, Jan. 1964 - Jun. 1974
Feb. 1975 22 p
(AD-A006143; USAAVSCOM-TR-74-56) Avail: NTIS CSCL 01/3

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distribution can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. GRA

N75-30150# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
AMRL REMOTELY PILOTED VEHICLE (RPV) SYSTEM SIMULATION STUDY 2: RESULTS
Robert G. Mills, Robert F. Bachert, and Milss M. Aume Feb. 1975 40 p
(AF Proj. 7184)
(AD-A006142; AMRL-TR-75-13) Avail: NTIS CSCL 01/3

The AMRL RPV System Simulation and Research Program was initiated in April 1973 in response to requirements for support of the design of the man-machine/environment interface of AF RPV systems. The major objectives of the AMRL RPV System Simulation and Research Program are as follows: (1) perform RPV system design evaluation studies, i.e., evaluate alternative design configurations, assumptions, operating procedures, etc.; (2) assess RPV system effectiveness, i.e., evaluate the expected effectiveness of a given system configuration such as its overall probability of achieving a target, etc.; (3) provide man-machine/environment interface engineering data, i.e., evaluate effectiveness of contractor designed consoles, video bandwidth compression techniques. GRA

N75-30151# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
CATAPULT AND ARRESTED LANDING FATIGUE TESTS OF THE MODEL E-2A/B AIRPLANE Final Report
E. F. Kautz 17 Oct. 1974 59 p refs
(AD-A005770; NADC-74199-30) Avail: NTIS CSCL 01/3

A laboratory fatigue test was performed on an E-2 fuselage to determine if it could sustain the effects of 3000 arrested landings and 4000 catapult launches. The right-hand keel beam failed after 4556 catapult test cycles. Using a test scatter factor of 2, this is equivalent to 2278 service catapult launches. The keel beam was repaired and modified and testing was continued until a total of 8000 catapult test cycles had been applied. GRA

N75-30152# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ECONOMIC MODEL TO DETERMINE COSTS WHEN INTERMEDIATE LEVEL REPAIR USES REMOTELY LOCATED AUTOMATIC TEST EQUIPMENT M.S. Thesis
James T. Garrett, Jr. and Neal W. Gentry Jan. 1975 112 p refs
(AD-A006341; SLSR-13-75A) Avail: NTIS CSCL 15/5

Since the 1950's, the Air Force has recognized the advantages and flexibility of repairing items at the base or intermediate level. However, over the past few years the increased complexity and sophistication of modern weapon systems has brought about the advent of complex and expensive automated test equipment.

In order to maintain the advantages of intermediate repair, the expensive test equipment had to be procured for and maintained by the individual operating bases; thus producing a very high life cycle cost. In an effort to reduce cost in the face of austere funding, a study was conducted to determine the economic feasibility of centralizing the automatic test equipment. GRA

N75-30153# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Flight Control Div.
FORMULATIONS OF THE EQUATIONS OF MOTION OF AN ELASTIC AIRCRAFT FOR STABILITY AND CONTROL AND FLIGHT CONTROL APPLICATIONS
Robert C. Schwanz Aug. 1972 69 p refs
(AD-A006391; AFFDL/FGC-TM-72-14) Avail: NTIS CSCL 01/1

This technical memorandum presents a derivation of the equations of motion for large and small disturbance perturbations from a reference state of motion. The small perturbation equations of motion are then generalized to include the effects of atmospheric turbulence and gusts on the controls-free elastic aircraft. The resulting equations are termed the EXACT formulation. These EXACT equations may be used to evaluate the stability and performance of integrated flight control systems of the Control Configured Vehicle (CCV) type. The equations are unique in that they describe a highly damped system using motion coordinates referenced to a body fixed, mean, non-inertial axis. GRA

N75-30154# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
INVESTIGATION OF HELICOPTER DOOR, WINDOW, AND ACCESS PANEL LOSSES Final Report
William Wiesemann and James McNamara 15 Jan. 1975 56 p
(AD-A005882; NADC-74169-30) Avail: NTIS CSCL 01/3

Door, window and access panel losses have occurred in a number of helicopters. These losses are costly and cause safety problems to personnel and aircraft. This report describes the investigation and analysis that was conducted to determine the major causes of helicopter panel losses and to identify those panels with high incidence of recurrence. Conclusions have been drawn and recommendations made to improve retrofit and future design of aircraft. GRA

N75-30155# United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
FABRICATED HELICOPTER TRANSMISSION HOUSING ANALYSIS Final Report, 18 Dec. 1972 - 18 Oct. 1973
Alexander Korzun and Stephen Schuman Jan. 1975 298 p
(Contract DAAJ02-73-C-0022; DA Proj. 1F1-62203-A-119)
(AD-A008995; USAAMRDL-TR-74-14) Avail: NTIS CSCL 21/5

The helicopter transmission housing study provides a transmission housing design superior to the conventional magnesium cast housing. The new design is a welded steel fabricated truss-like structure, corrosion resistant, and not susceptible to creep. The aircraft selected for this study was the U.S. Army CH-54B helicopter. The new fabricated truss-like housing was designed to be interchangeable with the present CH-54B magnesium main transmission housing. It meets all the interface and functional requirements of the cast housing design. Loads for flight and crash conditions, as well as stiffness criteria, were developed to permit structural analysis and comparison with the existing casting design. GRA

N75-30156# Menasco Mfg. Co., Burbank, Calif.
SYSTEM MODIFICATION DATA. MODIFICATION OF T-39 NLG DRAWINGS AND ANALYSES. REFERENCE CONTRACT ITEM 0002, DATA ITEM A003
C. Y. Chu 27 Mar. 1972 130 p Revised
(Contract F42600-71-C-1764)
(AD-A008651; SR034-Rev-B) Avail: NTIS CSCL 01/3

The report contains the Static and Fatigue Stress Analysis and supplementary engineering data required to support the design changes for modification of the T-39 Nose Landing Gear Assembly. GRA

N75-30157# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS: ESCAPE, RESCUE, AND SURVIVAL Annual Report, Jan. - Dec. 1975
Harold E. Amli Apr. 1975 23 p
(AD-A008596; ASD-TR-75-15) Avail: NTIS CSCL 06/11

The report is a part of a compilation of formalized Technology Needs (TN) covering Personnel Subsystems and Support Subsystems as identified by the Aeronautical Systems Division. They are based on development/operational experience, system studies and new concepts - all related to future system applications. Their presentation is to serve a threefold purpose; i.e., (1) guidance for technology program, (2) proven developmental potential, and (3) engineering data/requirements essential for technology use in systems. The identified needs delineate progress desired in performance, control, design flexibility, safety, and cost. GRA

N75-29998 Royal Aircraft Establishment, Bedford (England).
MODELLING OF SYSTEMS WITH A HIGH LEVEL OF INTERNAL FLUCTUATIONS
J. G. Jones *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs (For availability see N75-29997 21-01)

N75-30008 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FIVE IDENTIFICATION METHODS APPLIED TO FLIGHT TEST DATA
Jean-Pierre Chaquin *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p refs (For availability see N75-29997 21-01)

N75-30011 Royal Aircraft Establishment, Farnborough (England).
DETERMINATION OF AERODYNAMIC DERIVATIVES FROM TRANSIENT RESPONSES IN MANOEUVRING FLIGHT
A. Jean Ross *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)

N75-30015 Air Force Flight Test Center, Edwards AFB, Calif.
A COMPARISON AND EVALUATION OF TWO METHODS OF EXTRACTING STABILITY DERIVATIVES FROM FLIGHT TEST DATA
Paul W. Kirsten *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 26 p refs (For availability see N75-29997 21-01)

N75-30016 Technische Hogeschool, Delft (Netherlands).
ESTIMATION OF THE AIRCRAFT STATE IN NON-STEADY FLIGHT
J. A. Mulder *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01)

N75-30018 Systems Control, Inc., Palo Alto, Calif.
MODEL STRUCTURE DETERMINATION AND PARAMETER IDENTIFICATION FOR NONLINEAR AERODYNAMIC FLIGHT REGIMES
W. Earl Hall, Jr., Narendra K. Gupta, and James S. Tyler, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01)
(Contract N00014-72-C-0328)

N75-30019* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
IMPORTANCE OF HELICOPTER DYNAMICS TO THE MATHEMATICAL MODEL OF THE HELICOPTER
William F. White, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 12 p refs Prepared by Army Air Mobility Res. and Develop. Lab., Hampton, Va.
(For availability see N75-29997 21-01)
CSCL 01C

N75-30021* United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
ROTORCRAFT DERIVATIVE IDENTIFICATION FROM

ANALYTICAL MODELS AND FLIGHT TEST DATA
John A. Molusis *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 31 p refs Sponsored in part by NASA and USAAMRDL (For availability see N75-29997 21-01)
CSCL 01C

N75-30023 Bell Helicopter Co., Fort Worth, Tex.
COMMENTS ON COMPUTATION OF AIRCRAFT FLIGHT CHARACTERISTICS
C. L. Livingston *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p (For availability see N75-29997 21-01)

N75-30024 Calspan Corp., Buffalo, N.Y. Flight Research Dept.
THE EFFICIENT APPLICATION OF DIGITAL IDENTIFICATION TECHNIQUES TO FLIGHT DATA FROM A VARIABLE STABILITY V/STOL AIRCRAFT
J. Victor Lebacqz *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 13 p refs (For availability see N75-29997 21-01)
(Contracts N00019-69-C-0534; N00019-72-C-0044; N00019-72-C-0417; N00019-73-C-0504)

N75-30025* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PARAMETER ESTIMATION OF POWERED-LIFT STOL AIRCRAFT CHARACTERISTICS INCLUDING TURBULENCE AND GROUND EFFECTS
Rodney C. Wingrove *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)
CSCL 01C

N75-30026 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
ESTIMATION OF ELASTIC AIRCRAFT AERODYNAMIC PARAMETERS
Robert C. Schwanz and William R. Wells *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p refs (For availability see N75-29997 21-01)

N75-30028 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
CCV PHILOSOPHY: SEMANTICS AND UNCERTAINITY. THE CONCEPT OF AIRCRAFT REVOLUTION BY PROGRESS IN THE FLIGHT CONTROL SYSTEM [CCV PHILOSOPHIE: SEMANTIQUE ET INCERTITUDES LA CONCEPTION DES AVIONS VA-T-ELLE ETRE BOULEVERSEE PAR LES PROGRES DANS LES SYSTEMES DE COMMANDES DE VOL]
P. Lecomte and M. Bossard *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs In FRENCH; ENGLISH summary (For availability see N75-30027 21-01)

N75-30029 Royal Aircraft Establishment, Bedford (England).
ACTIVE CONTROL AS AN INTEGRAL TOOL IN ADVANCED AIRCRAFT DESIGN
W. J. G. Pinsker *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

N75-30041 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
CONTROL CONFIGURED VEHICLES B-52 PROGRAM RESULTS
Bruce T. Kujawski *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 8 p refs (For availability see N75-30027 21-01)

N75-30045 Sperry Rand Corp., Phoenix, Ariz. Sperry Flight Systems.
PRODUCTION DESIGN REQUIREMENTS FOR FLY BY WIRE SYSTEMS
J. Flannigan and J. Emfinger *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 11 p refs (For availability see N75-30027 21-01)

N75-30053 Ministry of Defence, Bonn (West Germany).
THE USE OF HELICOPTER CAPABILITIES IN BAD WEATHER NEEDS AND REQUIREMENTS FOR FUTURE EQUIPMENT
K. W. Ernst *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p (For availability see N75-30052 21-01)

N75-30055 Army Combat Developments Experimentation Command, Fort Ord, Calif.
EFFECT ON NAP-OF-THE-EARTH REQUIREMENTS ON AIRCREW PERFORMANCE DURING NIGHT ATTACK HELICOPTER OPERATIONS
In AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p refs (For availability see N75-30052 21-01)

N75-30056 United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
H-53 NIGHT OPERATIONS
Richard L. Mills *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs (For availability see N75-30052 21-01)

N75-30057 Human Engineering Labs., Aberdeen Proving Ground, Md.
US ARMY EXPERIENCE IN LOW-LEVEL NIGHT FLIGHT
Robert W. Bauer *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

N75-30065 Army Electronics Command, Fort Monmouth, N.J. Avionics Lab.
LOW LEVEL NIGHT OPERATIONS OF TACTICAL HELICOPTERS
William J. Kenneally *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 14 p refs (For availability see N75-30052 21-01)

N75-30069 Royal Aircraft Establishment, Farnborough (England). Experimental Flying Dept.
PILOTING ASPECTS OF V/STOL APPROACH GUIDANCE
C. C. Rustin *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01)

N75-30091 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
INFLUENCE ON THE TIME OF VARIOUS CLIMBING METHODS BEYOND THE KAISER TURN
H. Stuemke *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 15 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

N75-30997 Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
LIFE ASSURANCE OF FIGHTER AIRCRAFT EXEMPLIFIED BY THE F-104 G [SICHERUNG DER LEBENSDAUER VON KAMPFFLUGZEUGEN DARGESTELLT AM BEISPIEL DER F-104 G]
T. Gaymann and H. J. Zocher *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 44-75 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N75-30158*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A g-LOAD DISPLAY FOR REMOTELY PILOTED VEHICLES AND OTHER AIRCRAFT THAT ARE SUBJECT TO MANEUVERING CONSTRAINTS

James C. Howard Washington Sep. 1975 16 p refs (NASA-TN-D-8056; A-6032) Avail: NTIS HC $3.25 CSCL 01D

The absence of kinesthetic cues deprives RPV pilots of essential feedback, particularly during high speed maneuvers. A display was designed to facilitate pilot control of g loads and to permit an immediate indication of g-load constraint violations. The display embodies all the motion vector components that contribute to maneuvering accelerations. In one mode of operation, the device displays the components of angular velocity as variable length pointers emanating from the center of a circle whose radius is determined by the linear velocity of the vehicle. An alternative mode of operation permits the pilot to select a display in which g loads are presented directly as variable length pointers emanating from the center of a circle whose radius is again determined by the linear velocity of the vehicle. Each circle defines a safe region of operation, and penetration of the circumference of the appropriate circle by a pointer implies that the structural design load was exceeded. Author

N75-30159# RAND Corp., Santa Monica, Calif.
A PROPOSED STRATEGY FOR THE ACQUISITION OF AVIONICS EQUIPMENT Interim Report
D. W. McIver, A. I. Robinson, H. L. Shulman, and W. H. Ware Dec. 1974 36 p refs
(Contract F44620-73-C-0011)
(AD-A006147; R-1499-PR) Avail: NTIS CSCL 15/5

The strategy proposed in this report has as its goals improved operational reliability and reduced life-cycle support costs of avionics equipment through a new procurement policy and management structure. To achieve these goals, the authors suggest a development policy which uses multiple research approaches and an associate contractor structure managed by a separate Air Force Avionics Development Center. Fully developed building-block equipments, which will be ready when a weapon system requires them and which will be used in several systems, will include computer-program modules, mathematical models, test equipment, and a verified fault-isolation capability. GRA

N75-30160# General Electric Co., Wilmington, Mass. Aerospace Instruments and Product Support Dept.
VERTICAL BARAGRAPH DISPLAY Final Report, Jul. 1973 - May 1974
S. Aftergut, G. M. Gozeba, C. R. Stein, R. L. Skovholt, and W. W. Thurlow Feb. 1975 59 p refs
(Contract DAAB07-73-C-0255; DA Proj. 1F1-63207-DB-97)
(AD-A006245; DF75AEE110; ECOM-73-0255-F) Avail: NTIS CSCL 09/5

The program involves the generation of an advance approach to electronic aircraft instrumentation. The display media is a twisted nematic liquid crystal display (TN LCD). The instrument was designed as a one-for-one replacement for the existing vertical bargraph torque pressure indicator of the two engine OVID. One interim development model and two advanced development models were fabricated, tested and shipped. The display presentation is a dual thermometer bargraph type. The display is readable in night illumination and outdoor sunlight conditions. GRA

N75-30003 Technische Hogeschool, Delft (Netherlands).
ADVANCED FLIGHT TEST INSTRUMENTATION: DESIGN AND CALIBRATION
R. J. A. W. Hosman *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 17 p refs (For availability see N75-29997 21-01)

N75-30004* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A COMPLEMENTARY FILTERING TECHNIQUE FOR DERIVING AIRCRAFT VELOCITY AND POSITION INFORMATION
Frank R. Niessen *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 16 p refs (For availability see N75-29997 21-01)
CSCL 01C

N75-30005 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
SENSORS AND FILTERING TECHNIQUES FOR FLIGHT TESTING THE VAK 191 AND VFW 614 AIRCRAFT
Werner E. Seibold *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 14 p (For availability see N75-29997 21-01)

N75-30054 Army Operational Test and Evaluation Agency, Fort Belvoir, Va.
TRADEOFFS BETWEEN CREW TRAINING AND EXOTIC EQUIPMENT FOR NIGHT AND FOUL WEATHER FLYING
Elmer R. Ochs *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 2 p (For availability see N75-30052 21-01)

N75-30059 Royal Aircraft Establishment, Farnborough (England).
HELICOPTER AVIONICS: UK RESEARCH PROGRAMME
H. B. Johnson *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 7 p refs (For availability see N75-30052 21-01)

N75-30060 Naval Weapons Center, China Lake, Calif.
MICROWAVE RADIOMETRIC ALL-WEATHER IMAGING AND PILOTING TECHNIQUES
Robert P. Moore *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p (For availability see N75-30052 21-01)

N75-30061 Royal Aircraft Establishment, Farnborough (England). Instrumentation and Ranges Dept.
APPLICATIONS OF LOW LIGHT TELEVISION TO HELICOPTER OPERATIONS
R. J. Corps *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 2 p (For availability see N75-30052 21-01)

N75-30062 Army Electronics Command, Fort Monmouth, N.J. Avionics Lab.
AN OPTICAL RADAR SYSTEM FOR OBSTACLE AVOIDANCE AND TERRAIN FOLLOWING
C. M. Kellington *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

N75-30063 Royal Radar Establishment, Malvern (England). Airborne Radar Group.
IR THERMAL IMAGING SENSORS FOR HELICOPTERS
F. A. Holmes *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 4 p (For availability see N75-30052 21-01)

N75-30064 Army Night Vision Lab., Fort Belvoir, Va.
NIGHT VISION IMAGING SYSTEM DEVELOPMENT FOR LOW LEVEL HELICOPTER PILOTAGE
Karl Stich *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 5 p (For availability see N75-30052 21-01)

N75-30066 Royal Radar Establishment, Malvern (England).
TERRAIN AVOIDANCE RADAR USING OFF-BORESIGHT TECHNIQUES
W. M. Nixon *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 6 p refs (For availability see N75-30052 21-01)

N75-30067 Princeton Univ., N.J. Dept. of Aerospace and Mechanical Sciences.
DISPLAY FOR APPROACH AND HOVER WITH AND WITHOUT GROUND REFERENCE
Theodor A. Dukes *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01)
(Contracts DAAB07-72-C-0161; DAAB07-74-C-0051)

N75-30068 Royal Aircraft Establishment, Farnborough (England). Avionics Dept.
THE FLIGHT DEVELOPMENT OF ELECTRONIC DISPLAYS FOR V/STOL APPROACH GUIDANCE
J. N. Barrett and R. G. White *In* AGARD The Guidance and

Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 16 p refs (For availability see N75-30052 21-01)

N75-30070 Bell Helicopter Co., Fort Worth, Tex.
RESEARCH ON DISPLAYS FOR V/STOL LOW-LEVEL AND IMC OPERATIONS
Dora Dougherty Strother and Hubert W. Upton *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 11 p refs (For availability see N75-30052 21-01)

N75-30071 Human Engineering Labs., Aberdeen Proving Ground, Md.
FLIGHT SYMBOLOGY AUGMENTATION OF SENSOR DISPLAYS
William B. DeBellis and Clarence A. Fry *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 8 p refs (For availability see N75-30052 21-01)

N75-30074 VDO-Luftfahrtgeraete Werk Adolf Schindling G.m.b.H., Frankfurt (West Germany).
THE NUCLEAR LANDING AID FOR HELICOPTERS DURING THE FINAL APPROACH PHASE
Karl H. Busch *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 13 p (For availability see N75-30052 21-01)

N75-30075 MEL Equipment Co. Ltd., Crawley (England).
DEVELOPMENTS IN THE MADGE LANDING AID
D. Atter *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 7 p refs (For availability see N75-30052 21-01)

N75-30080 Societe de Fabrication d' Instruments de Mesure SFIM, Massy (France).
LOW VISIBILITY APPROACH OF HELICOPTERS AND ADAC AIRCRAFT [L'APPROCHE SANS VISIBILITIE DES HELICOPTERES ET DES AVIONS ADAC. CONSIDERATIONS SUR LE DEVELOPPEMENT ET RESULTATS OPERATIONNELS]
J. C. Grisard *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 22 p In FRENCH (For availability see N75-30052 21-01)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N75-30161# Advisory Group for Aerospace Research and Development, Paris (France).
POWER PLANT CONTROLS FOR AERO GAS TURBINE ENGINES
Klaus Bauerfeind and C. Deane McCarthy May 1975 14 p refs Presented at 44th Propulsion and Energetics Panel Meeting, Ustaoset Hoyfjellshotell, Norway, 9-13 Sep. 1974
(AGARD-AR-80) Avail: NTIS HC $3.25

The steady state and transient performance of aero gas turbine engines in a general fashion is treated. Control concepts and computer simulation techniques are discussed and control system hardware is presented. Author

N75-30162# Aeronautical Research Labs., Melbourne (Australia).
THE CONSTANT-VOLUME GAS TURBINE-REVISION OF THE SIMPLIFIED THEORETICAL ANALYSIS
J. E. Williams Feb. 1975 42 p refs
(ARL/ME-Note-356) Avail: NTIS HC $3.75 CSCL 21E

A simplified analysis of a constant volume gas turbine cycle is given which incorporates a thermodynamic treatment and a practical consideration of the combustor re-charging or scavenging process. It is shown that the main advantage of the constant volume over the constant pressure gas turbine is to be found at low compressor pressure ratios. Hence it may find applicability in small gas turbines where it is difficult to attain high compressor pressure ratios. The advantage in practice is very dependent upon actual turbine efficiency under conditions of pulsating flow. Discharge of some of the combustor contents to the turbine during combustion does not seriously reduce the thermal efficiency and hence a system with no exhaust valve is viable. An estimate is made of the turbine nozzle mass flow/area relationship and of the proportion of the cycle time during which the air inlet valve must be open. Objectives are set for operating fuel-air ratio and minimum acceptable combustion pressure rise for combustion experiments aimed to determine the feasibility of a combustor for a constant volume gas turbine. Author

N75-30163*# Lockheed-California Co., Burbank.
STUDY OF THE APPLICATION OF HYDROGEN FUEL TO LONG-RANGE SUBSONIC TRANSPORT AIRCRAFT, VOLUME 2 Final Report, Feb. - Oct. 1974
G. Daniel Brewer, R. E. Morris, R. H. Lange, and J. W. Moore Jan. 1975 380 p Prepared in cooperation with Lockheed-Georgia Co., Marietta, Ga.
(Contract NAS1-12972)
(NASA-CR-132559; LR-26752-2) Avail: NTIS HC$10.25 CSCL 21E

The feasibility, practicability, and potential advantages/disadvantages of using liquid hydrogen as fuel in long range, subsonic transport aircraft of advanced design were studied. Both passenger and cargo-type aircraft were investigated. To provide a valid basis for comparison, conventional hydrocarbon (Jet A) fueled aircraft were designed to perform identical missions using the same advanced technology and meeting the same operational constraints. The liquid hydrogen and Jet A fueled aircraft were compared on the basis of weight, size, energy utilization, cost, noise, emissions, safety, and operational characteristics. A program of technology development was formulated. Author

N75-30164*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DESIGN AND PERFORMANCE AT A LOCAL MACH NUMBER OF 6 OF AN INLET FOR AN INTEGRATED SCRAMJET CONCEPT
Carl A. Trexler and Sue W. Souders Washington Aug. 1975 142 p refs
(NASA-TN-D-7944; L-10000) Avail: NTIS HC $5.75 CSCL 01C

The development of a concept for a modular supersonic combustion ramjet which is designed to integrate with the airframe of a hypersonic vehicle is presented. The design philosophy and results of experiments at Mach 6 to evaluate the performance of the scramjet inlet are given. The inlet was designed with modest contraction ratio, fixed geometry, and three fuel injection struts which contributed to the inlet flow compression and provided a short combustor design that resulted in low internal cooling requirements. Results indicate that the inlet performance is well within the acceptable range for high engine performance. Author

N75-30165*# Boeing Commercial Airplane Co., Seattle, Wash.
EXPERIMENTAL EVALUATION OF A MACH 3.5 AXISYMMETRIC INLET
J. Syberg and J. L. Koncsek Washington NASA Jul. 1975 140 p refs
(Contract NAS2-8236)
(NASA-CR-2563; D6-42494) Avail: NTIS HC $5.75 CSCL 21E

Wind tunnel test results for a large scale inlet model designed for Mach 3.5 are presented and compared with analytical predictions. The inlet is an axisymmetric mixed-compression type with a lip diameter of 49.723 cm. The inlet design was developed using analytical procedures. Data are shown for freestream Mach numbers from 0.6 to 3.5. The test results indicate that boundary layer bleed requirements can be accurately predicted. Good agreement was obtained with analytical predictions of the flowfield structure and boundary layer

development in the supersonic diffuser yielding high performance at the design Mach number. The highest engine face total pressure recovery at Mach 3.5 was 85.8%; this was obtained at 0.05 Mach tolerance with only 2.8% total pressure distortion and 13.4% bleed. In the started Mach number range from 1.6 to 3.5, the total pressure recovery in the throat, downstream of the terminal normal shock, ranged between 91% and 95%. Total pressure losses in the subsonic diffuser varied from 3% to 13%. The higher losses occuring between Mach 2.5 and 3.2 were believed to be caused by the rapid rate of increase in the area of the diffuser just downstream of the throat, possibly coupled with inadequate centerbody throat bleed. In the unstarted mode at transonic speeds, the maximum inlet flow was over 99% of the theoretical maximum capture mass-flow. Author

N75-30166# Advisory Group for Aerospace Research and Development, Paris (France).
AIRCRAFT NOISE GENERATION, EMISSION AND REDUCTION
Jun. 1975 188 p refs Presented at Lecture Series, Belgium, 16-17 Jun. 1975 and West Germany, 19-20 Jun. 1975 and Great Britain, 23-24 Jun. 1975; sponsored by AGARD
(AGARD-LS-77) Avail: NTIS HC $7.00

The physical properties of aircraft noise are summarized, with special emphasis on jet noise and fan-compressor-propeller-rotor noise. Topics discussed include acoustic fundamentals, noise source characteristics and interactions, atmospheric propagation, airframe noise, sonic boom, duct liner, and muffler theory. Research and technology activities related to jet engine noise and its control are discussed, and the impact of this noise on people and communities and aircraft operational procedures for noise minimization are reviewed. For individual titles, see N75-30167 through N75-30173.

N75-30167 Toronto Univ. (Ontario). Inst. of Aerospace Studies.
JET AND AIRFRAME NOISE
Herbert S. Ribner *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 17 p refs (For availability see N75-30166 21-07)

Basic notions of acoustics (wave equation, plane and spherical waves, sources, dipoles, quadrupoles) are discussed along with an account of jet noise theory, from the dilatation (simple source) point of view, and from the equivalent quadrupole point of view. The quadrupole sources are shown to dictate a basic directional pattern (self noise and shear noise) which is powerfully modified by convection and refraction effects. The refraction by mean flow velocity gradients is illustrated by laboratory experiments. Jet noise suppression theory examines the role of bypass ratio, the mechanisms of multiple jet shielding, and of reflective shielding by a surface or a gas layer. Airframe noise, distinct from jet noise and other engine noise, is traced to a number of sources on the aircraft. Methods for estimating levels, spectra, and directivity are described. Author

N75-30168 Toronto Univ. (Ontario). Inst. of Aerospace Studies.
ATMOSPHERIC PROPAGATION AND SONIC BOOM
H. S. Ribner *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 11 p refs (For availability see N75-30166 21-07)

The attenuation of sound by atmospheric molecular effects, by turbulence, and by near horizontal propagation near the ground is discussed along with refraction, focussing, and defocussing effects, shadow zones and diffraction into shadow zones. Sonic boom is introduced as a 3D analog of the 2D V-shaped wave pattern of a boat. Various aspects of sonic boom theory were developed: evolution of the 'standard' N-wave pressure v. time signature, nonstandard signatures for minimum boom, refractive effects leading to a sonic boom 'corridor' and transonic 'cutoff', maneuver effects leading to focussed 'superbooms', and atmospheric effects leading to 'spiked' and 'rounded' boom signatures. Author

N75-30169 Southampton Univ. (England). Inst. of Sound and Vibration Research.
PEOPLE, COMMUNITIES AND AIRCRAFT OPERATIONS
J. B. Large *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 14 p refs (For availability see N75-30166 21-07)

The response of people to aircraft noise, the important phases of this research, and the methodology and the data available to make the choice for establishing noise criteria are discussed. Aircraft noise control through the application of noise abatement operational procedures is discussed. A review is given of operation problems, particularly take-off and approach procedures developed for noise control purposes, and the use of monitoring to control these procedures. Computer programs and flight simulators aid in the development of these flight procedures, and their uses are briefly discussed. Author

N75-30170 Center for the Study of Noise in Society, Glastonbury, Conn.
JET ENGINE NOISE AND ITS CONTROL
John M. Tyler *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 25 p refs (For availability see N75-30166 21-07)

The noise of turbojet and turbofan engines is described and presented in a form useable by engine and aircraft designers; it deals primarily with the practical aspects of aircraft powerplant noise. Noise from the wakes of turbojet and turbofan engines, the effects of engine cycle on wake noise, and the possibilities for noise reduction using exhaust noise suppressors are discussed. Methods for exhaust noise prediction are presented. Fan and compressor noise, including a description of the mechanisms of fan and compressor noise generation, was investigated. Design practices to minimize fan and compressor noise are presented. A discussion of turbine and combustion noise, and a summary of the state of the art in the research and development stage are included. Author

N75-30171 Westland Helicopters, Ltd., Yeovil (England).
ROTORCRAFT AND PROPELLER NOISE
Martin V. Lowson *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 26 p refs (For availability see N75-30166 21-07)

The fundamentals of propeller and helicopter noise radiation phenomena are presented, including a review of the implication of subjective response. Emphasis is placed on the underlying mechanisms of rotor noise generation, both for discrete frequency and broad band noise components. Implications for noise control are discussed. Author

N75-30172 Westland Helicopters, Ltd., Yeovil (England).
DUCT ACOUSTICS AND MUFFLERS
M. V. Lowson *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 34 p refs (For availability see N75-30166 21-07)

The fundamental features of sound propagation in lined ducts, with and without flow, are reviewed. Emphasis is placed on basic physical principles, and simplified results. A set of charts for direct evaluation of sound attenuation is given. Detail predictions necessitate computer analysis based on the basic equations, together with empirical engineering input on practical duct impedance boundary conditions. The design of liners is discussed, and the engineering trade-offs required in a practical aircraft design solution are reviewed briefly. Author

N75-30173 Environmental Protection Agency, Arlington, Va. Office of Noise Abatement and Control.
THE ROLE OF EPA IN REGULATING AIRCRAFT/AIRPORT NOISE
John C. Schettino and Harvey J. Nozick *In* AGARD Aircraft Noise Generation, Emission and Reduction Jun. 1975 13 p refs (For availability see N75-30166 21-07)

A principal finding in the study of aircraft and airport noise in compliance with the Noise Control Act of 1972, was that a comprehensive national program for aircraft/airport noise abatement was needed to insure that the noise control options available to the aircraft manufacturers and operators, the airport operators, the Federal Government, and other public authorities are implemented to protect the public health and welfare. To initiate implementation of this finding and to bring about near-term reductions in community noise levels, regulations are proposed for noise abatement flight procedures, noise source emissions (aircraft certification), and airport noise. For the longer term, a

study was conducted to determine the noise reductions required to progressively lower community noise levels resulting from aircraft operations and upon which to base a coordinated long-range aviation noise abatement and control program. The status of EPA regulations and the preliminary results of the long-range aviation noise requirements study are presented.
Author

N75-30174*# New York Univ., N.Y. Aerospace and Energetics Lab.
HYPERSONIC ENGINE AIRPLANE INTEGRATION Progress Report, 1 Feb. - 1 Sep. 1975
Sep. 1975 20 p
(Grant NGR-33-016-131)
(NASA-CR-143376) Avail: NTIS HC $3.25 CSCL 20E

A summary of the research activities is presented along with the design and analysis of an integrated scramjet engine which utilizes heat conduction flames. The scramjet engine model described was tested at a freestream Mach number of 4.0 by personnel at the General Applied Science Laboratory. The research effort was primarily concerned with the interpretation and analysis of the experimental data. The mixing tests were conducted with cold ambient air, while the combustion tests were conducted with hot vitiated air. The purpose of the cold mixing tests was to determine the degree of mixedness of the fuel at the ignitor station so as to certify if the fuel injection conditions and fuel injectors locations were properly selected to give a uniform fuel concentration profile at the ignitor station. A second objective was to assess the influence of the fuel injection on the inlet flow. Several fuel injection configurations were tested. Author

N75-30175*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIENCE WITH INTEGRALLY-CAST COMPRESSOR AND TURBINE COMPONENTS FOR A SMALL, LOW-COST, EXPENDABLE-TYPE TURBOJET ENGINE
Robert P. Dengler 1975 39 p refs Proposed for Presentation at 1975 Aerospace Eng. and Manuf. Meeting, Los Angeles, 17-20 Nov. 1975; Sponsored by SAE
(NASA-TM-X-71782; E-8441) Avail: NTIS HC $3.75 CSCL 21E

Experiences with integrally-cast compressor and turbine components during fabrication and testing of four engine assemblies of a small (29 cm (11 1/2 in.) maximum diameter) experimental turbojet engine design for an expendable application are discussed. Various operations such as metal removal, welding, and re-shaping of these components were performed in preparation of full-scale engine tests. Engines with these components were operated for a total of 157 hours at engine speeds as high as 38,000 rpm and at turbine inlet temperatures as high as 1256 K (1800 F). Author

N75-30176*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTERIM PREDICTION METHOD FOR EXTERNALLY BLOWN FLAP NOISE
Robert G. Dorsch, Bruce J. Clark, and Meyer Reshotko [1975] 51 p refs
(NASA-TM-X-71768; E-8423) Avail: NTIS HC $4.25 CSCL 20A

An interim procedure for predicting externally blown flap (EBF) noise spectra anywhere below a powered lift aircraft is presented. Both engine-under-the-wing and engine-over-the-wing EBF systems are included. The method uses data correlations for the overall sound pressure level based on nozzle exit area and exhaust velocity along with OASPL directivity curves and normalized one-third-octave spectra. Aircraft motion effects are included by taking into account the relative motion of the source with respect to the observer and the relative velocity effects on source strength. Author

N75-30177*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
EXPERIMENTAL CLEAN COMBUSTOR PROGRAM NOISE MEASUREMENT ADDENDUM, PHASE 1 Final Report
J. J. Emmerling Jul. 1975 113 p refs
(Contract NAS3-16830)
(NASA-CR-134853; GE75AEG315) Avail: NTIS HC $5.25 CSCL 21E

The test results of combustor noise measurements taken with waveguide probes are presented. Waveguide probes were shown to be a viable measurement technique for determining high sound pressure level broadband noise. A total of six full-scale annular combustors were tested and included the three advanced combustor designs: swirl-can, radial/axial, and double annular.
Author

N75-30178*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRELIMINARY STUDY OF THE FUEL SAVING POTENTIAL OF REGENERATIVE TURBOFANS FOR COMMERCIAL SUBSONIC TRANSPORTS
Gerald A. Kraft Aug. 1975 47 p refs
(NASA-TM-X-71785; E-8450) Avail: NTIS HC $3.75 CSCL 21E

The fuel savings potential of regenerative turbofans was calculated and compared with that of a reference turbofan. At the design altitude of 10.67 km and Mach 0.80, the turbine-inlet-temperature of the regenerative turbofan was fixed at 1700 K while the overall pressure ratio was varied from 10 to 20. The fan pressure ratio was fixed at 1.6 and the bypass ratio varied from 8 to 10. The heat exchanger design parameters such as pressure drop and effectiveness varied from 4 to 8 percent and from 0.80 to 0.90, respectively. Results indicate a fuel savings due to regeneration of 4.1 percent and no change in takeoff gross weight. Author

N75-30179*# Neilsen Engineering and Research, Inc., Mountain View, Calif.
FURTHER STUDIES OF METHODS FOR REDUCING COMMUNITY NOISE AROUND AIRPORTS
Richard H. Petersen, Donna J. Barry, and David M. Kline May 1975 275 p refs
(Contract NAS2-8190)
(NASA-CR-137739; NEAR-TR-86) Avail: NTIS HC $8.50 CSCL 20A

A simplified method of analysis was used in which all flights at a 'simulated' airport were assumed to operate from one runway in a single direction. For this simulated airport, contours of noise exposure forecast were obtained and evaluated. A flight schedule of the simulated airport which is representative of the 23 major U. S. airports was used. The effect of banning night-time operations by four-engine, narrow-body aircraft in combination with other noise reduction options was studied. The reductions in noise which would occur of two- and three-engine, narrow-body aircraft equipped with a refanned engine was examined. A detailed comparison of the effects of engine cutback on takeoff versus the effects of retrofitting quiet nacelles for narrow-body aircraft was also examined. A method of presenting the effects of various noise reduction options was treated. Author

N75-30180# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF RESIDUAL STRESSES IN THE SURFACE LAYER OF PARTS OF INTRICATE SHAPE
I. V. Semenchenko and L. I. Matagina 27 Nov. 1974 19 p Transl. into ENGLISH from the book "Povyshenie Ekspluatatsionnykh Svoistv Detaeli Poverkhn. Plasticheskim Deformirovaniem, materialy seminara" Moscow, Sbornik 1, 1971 p 82-91
(AD-A006000; FTD-MT-24-2837-74) Avail: NTIS CSCL 21/5

An investigation was made of residual stresses in the surface layer of parts of intricate shape; for example, blades of gas turbine engines. Proposed are the procedures and calculation for the axial residual stresses in the radius of the coupling of the foil and flange of the blades and tangential residual stresses in the edge of the blade foil. These procedures can be applied not only for the blades, but also for other parts which have similar elements, for example, the longitudinal paddles, the radius couplings of two surfaces, and so on. GRA

N75-30181# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
A STAGE-STACKING SIMULATION OF AXIAL FLOW COMPRESSORS WITH VARIABLE GEOMETRY Technical Report, Nov. 1972 - Dec. 1973
Robert D. Southwick Oct. 1974 93 p refs

(AD-A006407; ASD-TR-74-38) Avail: NTIS CSCL 21/5

Since most high performance axial flow compressors in development today have variable geometry, it is highly desirable to have the capability to evaluate various stator schedules as to their effect on compressor performance using computer simulation. The computer program covered in this report uses the stage-stacking method of analyzing compressor performance and uses input derived from test data in lieu of detailed design information. It can accomodate compressors with up to 15 stages, 10 of which can have variable stators. In addition to providing individual stage performance and overall compressor performance in a printout format, the program also contains a plotting routine for displaying the overall compressor map in graphical form. GRA

N75-30182# Bendix Corp., South Bend, Ind. Energy Controls Div.

TURBINE ENGINE CONTROL SYNTHESIS Final Technical Report

Samuel E. Arnett Dec. 1974 211 p refs

(Contract F33615-72-C-1716; AF Proj. 3066)

(AD-A005817; ECD-863-18667-R; AFAPL-TR-74-113) Avail: NTIS CSCL 21/5

A highly versatile, research type, externally programmable control system for use in development and evaluation of new modes of control was assembled at the Air Force Aero-Propulsion Laboratory. It includes: sensors and transducers to measure and transform engine operating state, engine geometry actuation devices and fuel control mechanisms, a J85-13 engine mounted the cell of Room 21, Building 18C of the AFAPL, a simulation of the J85 engine on the AFAPL's Applied Dynamics AD/Five Computer, programs for the IBM 1800 computer to control the engine and the simulated engines, and interface electronic equipment to complete the circuit between the digital computer, engine-mounted equipment and the simulated engine. GRA

N75-30183# Martin Marietta Aerospace, Orlando, Fla.

MAINTAINABILITY ENGINEERING DESIGN NOTEBOOK, REVISION 2, AND COST OF MAINTAINABILITY, VOLUME 2 Final Report

Lyle R. Greenman Jan. 1975 311 p Revised 3 Vol.

(Contract F30602-73-C-0201)

(AD-A009044/9; RADC-TR-74-308-Vol-2-Rev-2) Avail: NTIS HC $9.25 CSCL 21/5

The use of models and their application to the maintainability discipline are discussed. In addition, detailed task descriptions, guidelines, methodology, procedures, and a detailed example are presented for a revision of the Discard-at-Failure Maintenance (DAFM) mathematical model as contained in RADC-TR-68-187 (AD 842 399). This model is one example of the general and specific models which exist in industry today. GRA

N75-30184# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.

SMALL TURBINE ENGINE PERFORMANCE EVALUATION OF HIGH DENSITY FUELS. PART 1: BLENDS OF RJ-5 FUEL Final Report, May 1971 - Sep. 1973

Michael J. Pedersen Mar. 1975 100 p refs

(AF Proj. 3048)

(AD-A008784; AFAPL-TR-74-51-Pt-1) Avail: NTIS CSCL 21/4

To meet range and payload requirements, many of the proposed volume limited missile systems will require use of high volumetric energy fuels. The fuel candidate with the greatest potential for air-breathing engine application is the hydrocarbon Shelldyne-H. To reduce the viscosity and to improve starting capability, Shelldyne-H was blended with diluents to provide a variety of high density fuels suitable for different applications. A test program using a Williams WR 24-6 turbojet engine was conducted by the Fuels Branch of the Air Force Aero Propulsion Laboratory to evaluate the combustion performance of these blends compared to the conventional fuel, JP-4. In cooperation with ASD/RW86EJ, a flow test was performed on the various blends at -65F. GRA

N75-30185# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE SELECTION OF THE OPTIMUM DEGREE OF BLOCKING IN AFTERBURNERS

V. E. Reznik and N. B. Gorelova Mar. 1975 26 p refs Transl. into ENGLISH from Aviats. Inst. Kuibyshev Tr. (USSR), no. 45, 1970 p 82-92

(AD-A008809; FTD-MT-24-0997-75) Avail: NTIS CSCL 21/5

The dependence of the optimum (from the viewpoint of combustion stability) degrees of blocking on the reduced velocity of flow was investigated. Analyses of the obtained relationships were obtained and studied. It was found that with compressiblity taken into consideration, the optimum degree of blocking depend on the reduced velocity of the incident flow. M.J.S.

N75-30186# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CONSTRUCTIONAL POTENTIALS IN THE MODIFICATION OF COMPRESSOR STAGES WITH HINGE MOUNTED ROTATOR BLADES

G. I. Ishutin and V. I. Zryashchev 21 Feb. 1975 14 p refs Transl. into ENGLISH from Tr. Kuibyshev. Aviats. Inst. (USSR), no. 45, 1970 p 303-307

(AD-A008808; FTD-HT-23-1000-75) Avail: NTIS CSCL 21/5

The hinge mounting of turbomachine blades is discussed as a means of reducing the aerodynamic parameters for axial-flow compressors. The procedures for extending the vanes to the desired angle are described along with the wheel-assembly. Tests indicate reliable efficiency, and good results in the determination of the optimum installation angle for the rotor blades. F.O.S.

N75-30187# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

CORRELATION OF JET NOISE DATA IN TERMS OF A SELF NOISE SHEAR NOISE MODEL

Nagy Sabet Mikhail Nosseir Jan. 1975 44 p

(Grant AF-AFOSR-1885-70; AF Proj. 9781)

(AD-A008899; UTIAS-TN-193; AFOSR-75-0496TR) Avail: NTIS CSCL 21/5

The theoretical formalism of Ribner (1964 and 1969) was applied in the analysis of a large body of experimental jet noise data. It was found that the basic directivity which results on excluding convection and refraction effects could be decomposed unambiguously into self noise and shear noise. The basic self noise spectrum peaked approximately one octave higher than the shear noise spectrum, and the peak amplitudes were roughly in the ratio two to one. Upon frequency shifting and normalizing alignments, the two spectra were found to match well in shape. All these properties are in accord with the theory. The self noise-shear noise spectral similarity was applied in a formalism for jet noise prediction utilizing the theory. GRA

N75-30188# Teledyne CAE, Toledo, Ohio.

LOW COST JET FUEL STARTER DESIGN STUDY Final Technical Report, 1 May - 2 Dec. 1974

A. Gabrys and R. Smith 2 Dec. 1974 103 p

(Contract F33615-74-C-2041; AF Proj. 3145)

(AD-A008893; AFAPL-TR-74-104) Avail: NTIS CSCL 21/5

This report presents the preliminary design and cost analysis of a low cost jet fuel starter. This unit is an accessory to be used for starting main aircraft propulsion units, and requires only jet fuel and battery power to achieve safe reliable starts. The basic starter has a peak output of 150 horsepower, is 10.0 inches in diameter, 20 inches long and weighs 98 pounds. The starter is capable of operating over an ambient temperature range of -65F to 130F and at altitudes up to 8,000 feet. The design features a radial air inlet, axial exhaust, and a low speed concentric shaft, with front power output. The low speed (low stress) permits simple construction and low cost fabrication techniques with an overall reduction in total parts and cost when compared with typical high speed units. The cost analysis indicates that the starter selling price is less than $8,000 per unit in quantities of 100 per year, including tooling and R and D costs amortized over 2500 units. GRA

N75-30373 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).

SOME PROBLEMS AND ASPECTS IN COMBUSTOR MODELLING

F. Suttrop *In* AGARD Anal. and Numerical Methods for Invest.

of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 6 p (For availability see N75-30359 21-31)

N75-30996 Krupp (Fried.) G.m.b.H., Essen (West Germany).
DEVELOPMENT OF SUPERSONIC COMPRESSOR STAGES [ENTWICKLUNG VON UEBERSCHALLVER DICHTER-STUFEN]
W. Dettmering *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 14-43 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N75-30189*# Stanford Research Inst., Menlo Park, Calif. Information Sciences Lab.
AIRCRAFT DIGITAL CONTROL DESIGN METHODS Monthly Progress Report
Michael G. Tashker and J. David Powell (Stanford Univ.) Jun. 1975 36 p refs
(Grant NsG-1137)
(NASA-CR-143321; MPR-6) Avail: NTIS HC $3.75 CSCL 01C

Investigations were conducted in two main areas: the first area is control system design, and the goals were to define the limits of 'digitized S-Plane design techniques' vs. sample rate, to show the results of a 'direct digital design technique', and to compare the two methods; the second area was to evaluate the roughness of autopilot designs parametrically versus sample rate. Goals of the first area were addressed by (1) an analysis of a 2nd order example using both design methods, (2) a linear analysis of the complete 737 aircraft with an autoland obtained using the digitized S-plane technique, (3) linear analysis of a high frequency 737 approximation with the autoland from a direct digital design technique, and (4) development of a simulation for evaluation of the autopilots with disturbances and nonlinearities included. Roughness evaluation was studied by defining an experiment to be carried out on the Langley motion simulator and coordinated with analysis at Stanford. Author

N75-30190*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SUMMARY OF INFORMATION ON LOW-SPEED LATERAL-DIRECTIONAL DERIVATIVES DUE TO RATE OF CHANGE OF SIDESLIP BETA PRIME
Paul L. Coe, Jr., A. Bruce Graham, and Joseph R. Chambers Washington Sep. 1975 52 p refs Prepared in cooperation with Joint Inst. for Acoustics and Flight Sci.
(NASA-TN-D-7972; L-10112) Avail: NTIS HC $4.25 CSCL 01C

The results presented show that the magnitudes of the aerodynamic stability derivatives due to rate of change of sideslip become quite large at high angles of attack for swept- and delta-wing configurations, and that such derivatives have large effects on the calculated dynamic stability of these configurations at high angles of attack. The wind-tunnel test techniques used to measure the beta prime derivatives and various approaches used to predict them are discussed. Both the conventional oscillating-airfoil theory and the lag-of-the-sidewash theory are shown to be inadequate for predicting the vertical-tail contribution to the acceleration-in-sideslip derivative; a flow-field-lag theory, which is discussed, appears to give qualitative agreement with experimental data for a current twin-jet fighter configuration. Author

N75-30191# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX B. SPECIFICATION REVIEW CHANCE RECOMMENDATIONS SYSTEM
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 202 p
(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-119)
(AD-A009151; USAAMRDL-TR-74-57-App-B) Avail: NTIS CSCL 01/3

The supplement to USAAMRDL-TR-74-57 covers review of specifications for helicopter flight control systems. Recommended changes to the specifications are included in areas in which improvements could be made to requirements affecting system and mission reliability and maintainability. GRA

N75-30192# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX C. SPECIFICATION REVIEW CHANGE RECOMMENDATIONS, COMPONENTS, PART 1 Final Report
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 960 p
(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-11903)
(AD-A009152; USAAMRDL-TR-74-57-App-C-Pt-1) Avail: NTIS CSCL 01/3

This supplement to USAAMRDL-TR-74-57 covers review of specifications concerning components of helicopter flight control systems. Recommended changes to the specifications are included in areas in which improvements could be made to requirements affecting system and mission reliability and maintainability. GRA

N75-30193# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX C. SPECIFICATION REVIEW CHANGE RECOMMENDATIONS, COMPONENTS, PART 2 Final Report
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 921 p
(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-11903)
(AD-A009153; USAAMRDL-TR-74-57-App-C-Pt-2) Avail: NTIS CSCL 01/3

This supplement to USAAMRDL-TR-74-57 covers review of specifications concerning components of helicopter flight control systems. Recommended changes to the specifications are included in areas in which improvements could be made to requirements affecting system and mission reliability and maintainability. GRA

N75-30194# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX D. SPECIFICATION REVIEW CHANGE RECOMMENDATIONS, STRUCTURE
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 161 p
(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-11903)
(AD-A009154; USAAMRDL-TR-74-57-App-D) Avail: NTIS CSCL 01/3

This supplement to USAAMRDL-TR-74-57 covers review of specifications concerning structural design of helicopters. Recommended changes to the specifications are included in areas in which improvements could be made to requirements affecting system and mission reliability and maintainability. GRA

N75-30195# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX E. SPECIFICATION REVIEW CHANGE RECOMMENDATIONS, COCKPIT ARRANGEMENT
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 41 p
(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-119)
(AD-A009155; USAAMRDL-TR-74-57-App-E) Avail: NTIS CSCL 01/3

The supplement to USAAMRDL-TR-74-57 covers review of specifications concerning cockpit arrangements. Recommended changes to the specifications are included in areas in which improvements could be made to requirements affecting system and mission reliability and maintainability. GRA

N75-30196# Bell Helicopter Co., Fort Worth, Tex.
FLIGHT CONTROL SYSTEM RELIABILITY AND MAINTAINABILITY INVESTIGATIONS. APPENDIX F. DESIGN HANDBOOK, DH-2-1, DH-2-X
John Zipperer, Gavin Jenney, and Jerry Bryant Mar. 1975 167 p

(Contract DAAJ02-73-C-0026; DA Proj. 1F1-62203-A-119)
(AD-A009156; USAAMRDL-TR-74-57-App-F) Avail: NTIS CSCL 01/3

The supplement to USAAMRDL-TR-74-57 includes recommended changes to Design Handbooks DH-21, DH-2-X. The changes recommended would help to improve requirements affecting system and mission reliability and maintainability. GRA

N75-30197# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DIFFERENTIAL THRUST CONTROLLER FOR AIR CUSHION LANDING SYSTEM AIRCRAFT M.S. Thesis
Matthew A. Husson Dec. 1974 108 p refs
(AD-A008662; GE/EE/74-51) Avail: NTIS CSCL 01/3

A control system was designed to improve the heading response of the Air Cushion Landing System aircraft to differential thrust input. The aircraft equations of motion and low speed stability derivatives were obtained from work done at the Air Force Flight Dynamics Laboratory at Wright-Patterson Air Force Base, Ohio. Five different values of engine response time-delay were selected for the design study. These time-delay values were 0.2, 0.4, 0.6, 0.8, and 1.0 seconds. The principle used for the design was to compensate the system ignoring the time-delay and then to compensate for the time-delay. A two stage lead netwqrk was used to reduce the effect of the engine time-delay. The system was simulated by using a digital computer program called MIMIC, which simulates the functions of an analog computer. GRA

N75-29999 Calspan Corp., Buffalo, N.Y.
IDENTIFICATION OF NONLINEAR AERODYNAMIC STABILITY AND CONTROL PARAMETERS AT HIGH ANGLE OF ATTACK
B. J. Eulrich and E. G. Rynaski *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
(Contract F33615-72-C-1248)

N75-30002* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A MONTE CARLO ANALYSIS OF THE EFFECTS OF INSTRUMENTATION ERRORS ON AIRCRAFT PARAMETER IDENTIFICATION
Wayne H. Bryant and Ward F. Hodge *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 19 p refs (For availability see N75-29997 21-01)
CSCL 01C

N75-30006 National Aerospace Lab., Amsterdam (Netherlands).
DESIGN AND EVALUATION OF A SYMMETRIC FLIGHT-TEST MANOEUVRE FOR THE ESTIMATION OF LONGITUDINAL PERFORMANCE AND STABILITY AND CONTROL CHARACTERISTICS
H. W. Kleingeld *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 6 p refs (For availability see N75-29997 21-01)

N75-30007 Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF STABILITY DERIVATIVES FROM FLIGHT TEST RESULTS COMPARISON OF FIVE ANALYTICAL TECHNIQUES
Horst Wuennenberg, Heinz Friedrich, Ulrich VonMeier, and Hans-Joachim Munser *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 12 p refs (For availability see N75-29997 21-01)

N75-30009* Harvard Univ., Cambridge, Mass.
STATUS OF INPUT DESIGN FOR AIRCRAFT PARAMETER IDENTIFICATION
R. K. Mehra and N. K. Eupta (Systems Control, Inc.) *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 21 p refs (For availability see N75-29997 21-01)
(Contracts NAS4-2068; N00014-67-A-0298-0006)
CSCL 01C

N75-30010 Calspan Corp., Buffalo, N.Y. Flight Research Dept.
INPUT DESIGN FOR AIRCRAFT PARAMETER IDENTIFICATION: USING TIME-OPTIMAL CONTROL FORMULATION
Robert T. N. Chen *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
(Contract N00019-73-C-0504)

N75-30012 Naval Air Test Center, Patuxent River, Md. Flight Test Div.
ADVANCEMENT IN PARAMENTER IDENTIFICATION AND AIRCRAFT FLIGHT TESTING
Roger A. Burton *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 16 p refs (For availability see N75-29997 21-01)

N75-30013* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
PRACTICAL ASPECTS OF USING A MAXIMUM LIKELIHOOD ESTIMATOR
Kenneth W. Iliff and Richard E. Maine *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 15 p refs (For availability see N75-29997 21-01)
CSCL 01C

N75-30014 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
DETERMINATION OF AIRCRAFT DERIVATIVES BY AUTOMATIC PARAMETER ADJUSTMENT AND FREQUENCY RESPONSE METHODS
M. Marchand and R. Koehler *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs (For availability see N75-29997 21-01)

N75-30017 Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF STABILITY DERIVATIVES FROM FLIGHT TEST RESULTS BY MEANS OF THE REGRESSION ANALYSIS
Heniz, Friedrich *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 8 p refs (For availability see N75-29997 21-01)

N75-30020 National Aeronautical Establishment, Ottawa (Ontario). Flight Research Lab.
ESTIMATES OF THE STABILITY DERIVATIVES OF A HELICOPTER AND A V/STOL AIRCRAFT FROM FLIGHT DATA
D. G. Gould and W. S. Hindson *In* AGARD Method for Aircraft State and Parameter Identification Jul. 1957 9 p refs (For availability see N75-29997 21-01)

N75-30022* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
ROTOR SYSTEMS RESEARCH AIRCRAFT (RSRA) REQUIREMENTS FOR, AND CONTRIBUTIONS TO, ROTORCRAFT STATE ESTIMATION AND PARAMETER IDENTIFICATION
Gregory W. Condon *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 18 p refs Prepared by Army Air Mobility Res. and Develop. Lab., Hampton, Va. (For availability see N75-29997 21-01)
CSCL 01C

N75-30030* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
POTENTIAL BENEFITS TO SHORT-HAUL TRANSPORTS THROUGH USE OF ACTIVE CONTROLS
D. William Conner and Glenn O. Thompson (Boeing Co., Wichita, Kans.) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 10 p refs (For availability see N75-30027 21-01)

N75-30031 Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
TRANSPORT AIRCRAFT WITH RELAXED/NEGATIVE LONGITUDINAL STABILITY: RESULTS OF A DESIGN STUDY

Heinz G. Klug *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p (For availability see N75-30027 21-01)

N75-30032 British Aircraft Corp., Weybridge (England). Commercial Aircraft Div.
IMPACT OF ACTIVE CONTROL TECHNOLOGY ON AIRCRAFT DESIGN
P. R. G. Williams and B. S. Campion *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 6 p (For availability see N75-30027 21-01)

N75-30033 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
HORIZONTAL CANARDS FOR TWO-AXIS CCV FIGHTER CONTROL
S. C. Stumpfl and R. A. Whitmoyer *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 8 p refs (For availability see N75-30027 21-01)

N75-30034 Hawker Siddeley Aviation Ltd., Brough (England).
ACTIVE CONTROL TECHNOLOGY: A MILITARY AIRCRAFT DESIGNER'S VIEWPOINT
R. Melling *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 16 p (For availability see N75-30027 21-01)

N75-30035 National Aerospace Lab., Amsterdam (Netherlands).
HANDLING QUALITY CRITERIA DEVELOPMENT FOR TRANSPORT AIRCRAFT WITH FLY-BY-WIRE PRIMARY FLIGHT CONTROL SYSTEMS
H. A. Mooij *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs (For availability see N75-30027 21-01)

N75-30036 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
CONTROL OF AN ELASTIC AIRCRAFT USING OPTIMAL CONTROL LAWS
Werner Dressler *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 11 p (For availability see N75-30027 21-01)

N75-30037 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CLOSED FORM EXPRESSION OF THE OPTIMAL CONTROL OF A RIGID AIRPLANE TO TURBULENCE
Gabriel Coupry *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 10 p refs In FRENCH; ENGLISH summary (For availability see N75-30027 21-01)

N75-30038 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.
APPLICATION OF ADVANCED MODEL-FOLLOWING TECHNIQUES TO THE DESIGN OF FLIGHT CONTROL SYSTEMS FOR CONTROL CONFIGURED VEHICLES
Gerd Hirzinger *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p refs (For availability see N75-30027 21-01)

N75-30039 McDonnell Aircraft Co., St. Louis, Mo.
SURVIVABLE FLIGHT CONTROL SYSTEM: ACTIVE CONTROL DEVELOPMENT, FLIGHT TEST, AND APPLICATION
F. M. Krachmalnick, R. L. Berger (AFFDL), J. E. Hunter, J. W. Morris (AFFDL), and J. K. Ramage (AFFDL) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 24 p (For availability see N75-30027 21-01)

N75-30040 Air Force Armament Lab., Eglin AFB, Fla.
WEAPON DELIVERY IMPACT ON ACTIVE CONTROL TECHNOLOGY
H. Smith and Dave Carleton (AFFDL) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1971 14 p refs (For availability see N75-30027 21-01)

N75-30042 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
A QUADRUREDUNDANT DIGITAL FLIGHT CONTROL SYSTEM FOR CCV APPLICATION
Wolfgang J. Kubbat *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 9 p (For availability see N75-30027 21-01)

N75-30043 Naval Air Development Center, Warminster, Pa.
THE ASSET (ADVANCED SKEWED SENSORY ELECTRONIC TRIAD) PROGRAM
C. R. Abrams and W. D. Weinstein (Grumman Aerospace Corp.) *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

N75-30044 Marconi-Elliott Avionic Systems Ltd., Rochester (England). Flight Control Div.
THE RELEVANCE OF EXISTING AUTOMATIC FLIGHT CONTROL SYSTEMS TO THE FUTURE DEVELOPMENT OF ACTIVE CONTROL
R. Ruggles, D. Sweeting, and I. A. Watson *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 15 p refs (For availability see N75-30027 21-01)

N75-30046 British Aircraft Corp. (Operating) Ltd., Bristol (England). Avionics Engineering Dept.
EXPERIENCE WITH THE CONCORDE FLYING CONTROL SYSTEM
Neville Brenchley and Ronald Grant *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p (For availability see N75-30027 21-01)

N75-30047 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
DESIGN OF AN ENTIRELY ELECTRICAL FLYING CONTROL SYSTEM
G. Broihanne, R. Deque, and M. Bossard *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 13 p (For availability see N75-30027 21-01)

N75-30048 Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.
THE HUNTER FLY-BY-WIRE EXPERIMENT: RECENT EXPERIENCE AND FUTURE IMPLICATIONS
F. R. Gill and P. W. J. Fullham *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 12 p refs (For availability see N75-30027 21-01)

N75-30049* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
F-8 DIGITAL FLY-BY-WIRE FLIGHT TEST RESULTS VIEWED FROM AN ACTIVE CONTROLS PERSPECTIVE
Kenneth J. Zalai and Dwain A. Deets *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 14 p refs (For availability see N75-30027 21-01)

N75-30050 Boeing Commercial Airplane Co., Seattle, Wash.
USE OF ACTIVE CONTROL TECHNOLOGY TO IMPROVE RIDE QUALITIES OF LARGE TRANSPORT AIRCRAFT
Gerald C. Cohen and Richard L. Schoenman *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1975 16 p refs (For availability see N75-30027 21-01)

N75-30051 Lockheed-Georgia Co., Marietta.
THE C-5A ACTIVE LIFT DISTRIBUTION CONTROL SYSTEM
William F. Grosser, Wayne W. Hollenbeck, and Don C. Eckholdt *In* AGARD Impact of Active Control Technol. on Airplane Design Jun. 1971 18 p refs (For availability see N75-30027 21-01)

N75-30077 Boeing Vertol Co., Philadelphia, Pa.
HEAVY-LIFT HELICOPTER FLIGHT CONTROL SYSTEM DESIGN
E. D. Diamond and J. M. Davis *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 10 p (For availability see N75-30052 21-01)

N75-30078 Royal Aircraft Establishment, Farnborough (England).
HELICOPTER AUTOMATIC FLIGHT CONTROL SYSTEMS FOR POOR VISIBILITY OPERATIONS
P. Robinson, J. L. Hollington (Smiths Industries Ltd.), and J. Meadows (Smiths Industries Ltd.) *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 13 p refs (For availability see N75-30052 21-01)

N75-30079 Sperry Rand Corp., Phoenix, Ariz.
AN AUTOMATIC FLIGHT CONTROL SYSTEM FOR A HELICOPTER NIGHT LANDING SYSTEM
R. J. Miller and E. R. Tribken *In* AGARD The Guidance and Control of V/STOL Aircraft and Helicopters at Night and in Poor Visibility May 1975 9 p refs (For availability see N75-30052 21-01)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N75-30198# Advisory Group for Aerospace Research and Development, Paris (France).
A CATALOGUE OF EUROPEAN HYPERSONIC WIND TUNNEL FACILITIES
Jun. 1975 58 p
(AGARD-R-619) Avail: NTIS HC $4.25

European hypersonic windtunnels are listed and the following information is given about them: location, name of facility, and personnel concerned; description and testing capabilities, type of facility, details of working section, model mounting, and size at zero and nonzero incidence; instrumentation and other diagnostic equipment; and performance. For high enthalpy facilities, the data is plotted in terms of density versus velocity; for other facilities as RE/cm - Mach number showing operating boundaries. Nozzle exit diameter, useful core diameter, axial Mach number gradient, angular flow deviation 'reservoir' conditions, gases used, frozen degree of dissociation, limiting velocity, for continuous flow tunnels and for low-density tunnels a graph of mass flow rate versus static pressure are included where available. Author

N75-30199*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHAKE TEST OF ROTOR TEST APPARATUS WITH BALANCE DAMPERS IN THE 40 BY 80 FOOT WIND TUNNEL
Wayne Johnson and James G. Biggers Jul. 1975 37 p ref Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TM-X-62470; A-6229) Avail: NTIS HC $3.75 CSCL 14B

A shake test was conducted to determine the dynamic characteristics of a rotor test apparatus on two strut systems with balance dampers in the Ames 40- by 80-ft wind tunnel. The rotor-off hub transfer function (acceleration per unit force as a function of frequency) was measured in the longitudinal and lateral directions, using a combination of broadband and discrete frequency excitation techniques. The dynamic data are summarized for the configurations tested, giving the following properties for each mode indentified: the natural frequency, the hub response at resonance, the fixed system damping, the damping ratio, and the modal mass. The complete transfer functions are presented, and the detailed test results are included as an appendix. Author

N75-30200# Royal Aircraft Establishment, Farnborough (England).
CONSIDERATIONS ON AN AERO-ACOUSTIC WIND TUNNEL PROJECT
G. Schulz May 1975 16 p refs Transl. into ENGLISH from Deut. Luft- und Raumfahrt, Mitt-74-27, (West Ger.), 1974
(RAE-Lib-Trans-1843; BR48209; Mitt-74-27) Avail: NTIS HC $3.25

The avoidance, insulation, and damping of flow sound, and its role in environmental protection and experimental research are discussed. Topics discussed include construction features of the wind tunnel, various types of damping measures, characteristics noise of the free jet, fan noise, and the sound intensity. M.J.S.

N75-30201*# Scientific Translation Service, Santa Barbara, Calif.
CONSIDERATIONS FOR THE PROJECT OF AN AERO-ACOUSTICAL WIND TUNNEL
G. Schulz Washington NASA Aug. 1975 20 p refs Transl. into ENGLISH of "Ueberlegungen zum Projekt eines Aeroakustik-Windkanals", Rept. DLR-Mitt-74-27, West Germany, 1974 p 1-18
(Contract NASw-2791)
(NASA-TT-F-16508; DLR-Mitt-74-27) Avail: NTIS HC $3.25 CSCL 14B

The possibility of adapting a subsonic aerodynamic wind tunnel to serve as an aero-acoustical wind tunnel was investigated. One approach is to eliminate, by soundproofing, the noise generated in the wind tunnel itself, the reflections of the channel noise and of the test model at the tunnel walls and possibly at the walls of the measurement room, and the noise produced by the microphone subjected to the wind. An evaluation table for establishing the suitability of wind tunnel types for an aero-acoustical wind tunnel was also prepared. It is shown that the design features for good aerodynamic and aero-acoustical wind tunnels are contradictory, and that the same tunnel cannot be used for both purposes by making some small modifications. It is concluded that it would be better to build a special tunnel for acoustic purposes. Design parameters for such a tunnel are described. Y.A.

N75-30202*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DESCRIPTION AND INITIAL OPERATING PERFORMANCE OF THE LANGLEY 6-INCH EXPANSION TUBE USING HEATED HELIUM DRIVER GAS
John A. Moore Washington Sep. 1975 41 p refs
(NASA-TM-X-3240; L-9900) Avail: NTIS HC $3.75 CSCL 14B

A general description of the Langley 6-inch expansion tube is presented along with discussion of the basic components, internal resistance heater, arc-discharge assemblies, instrumentation, and operating procedure. Preliminary results using unheated and resistance-heated helium as the driver gas are presented. The driver-gas pressure ranged from approximately 17 to 59 MPa and its temperature ranged from 300 to 510 K. Interface velocities of approximately 3.8 to 6.7 km/sec were generated between the test gas and the acceleration gas using air as the test gas and helium as the acceleration gas. Test flow quality and comparison of measured and predicted expansion-tube flow quantities are discussed. Author

N75-30203# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
FIELD TESTS OF T16 MEMBRANE BENEATH AM2-AM5-LANDING-MAT-SURFACED SATS AIRFIELD Final Report
Richard H. Grau Jan. 1975 33 p refs
(DA Proj. 1T0-62103-A-046)
(AD-A006144; AEWES-TR-S-75-2) Avail: NTIS CSCL 01/5

This study was conducted to determine the ability of a lightweight membrane (designated T16) to waterproof the soil subgrade beneath an AM2-AM5-landing-mat-surfaced Small Airfield for Tactical Support (SATS) runway and taxiway. The SATS runway and taxiway were located at the U.S. Naval Air Test Facility (NATF), Naval Air Station, Lakehurst, N.J. The runway was 2800 ft long and 36 ft wide. A 2100-ft-long catapult guide rail and a standard SATS catapult holdback arrangement were installed at the eastern end of the SATS runway. The taxiway connected the SATS runway to the main NATF runway. An area 150 ft long and 72 ft wide located on the runway beneath the catapult holdback arrangement and an area 150 ft

long and 36 ft wide located on the taxiway were surfaced with T16 membrane. GRA

N75-30204# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
DESIGN OF CIVIL AIRFIELD PAVEMENTS FOR SEASONAL FROST AND PERMAFROST CONDITIONS Final Report
Richard L. Berg Oct. 1974 98 p refs
(Contract FA71WAI-218)
(AD-A006284; FAA-RD-74-30) Avail: NTIS CSCL 01/5

A supply of water, freezing temperatures, and frost-susceptible soil is essential to cause frost action. The report describes the frost susceptibility of various FAA soil groups. The detrimental effects of the frost heaving of airfield pavements are controlled by using one of the following design methods: the complete protection method, the limited subgrade frost penetration method, or the reduced subgrade frost protection method. The detrimental effects of soil weakening due to thawing are minimized by applying the reduced subgrade strength design method. The modified Berggren equation and numerical methods for estimating frost and thaw depths are presented. Similar design methods are presented for airfield pavements in permafrost regions. A glossary of specialized terms used in the literature on frost and permafrost is included. GRA

N75-30205# Naval Training Equipment Center, Orlando, Fla.
FACTORS SURROUNDING MOTION PLATFORM: VISUAL SYSTEM COUPLING IN FLIGHT SIMULATORS Final Report
Richard C. Rapson, Jr. 14 Feb. 1975 12 p
(AD-A006462; NAVTRAEQUIPC-TN-42) Avail: NTIS CSCL 05/9

Some of the factors affecting the behavior of motion systems and visual systems used simultaneously are considered. In particular, the flight visual motion coupling problem is addressed, with respect to the necessary iteration rates of inputs, outputs, and the iteration rates of numerical computations. Data are presented for several OFT/WST simulators having both motion and visual systems. Conclusions and recommendations are drawn, based upon the results obtained. GRA

N75-30206# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
WIND TUNNELS
S. M. Gorlin, N. A. Nironov, and G. E. Knudyakov 26 Feb. 1975 38 p refs Transl. into ENGLISH from Tr. Aerodinamicheskie of Inst. Mekhan. (Moscow), 1971 p 4-24
(AD-A008761; FTD-MT-24-0625-75) Avail: NTIS CSCL 14/2

The A-6 wind tunnel of the institute of Mechanics of the Moscow University is described. A schematic of the facility and descriptions of test equipment are included. F.O.S.

N75-30207# Naval Material Command, Washington, D.C.
PROCEDURE FOR THE SELECTION OF AUTOMATIC TEST EQUIPMENT (ATE)
Aug. 1974 39 p
(AD-A009052) Avail: NTIS CSCL 14/2

Selection of automatic test equipment (ATE) is a support function that is a part of the Integrated Logistic Support/Logistic Support Analysis (ILS/LSA) areas of platform and prime system development. All of the actions taking place in parallel to the ATE selection are included for each phase of the acquisition cycle. This enables the planners/managers to key the ATE selection actions to events in the acquisition process. Too often ILS actions in general, and ATE selection in particular, takes place later than what would be optimum. Only by the parallel development of ATE and the prime equipment, can it be assumed that the equipment will be fully effective when introduced for fleet use. GRA

N75-30208# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE COEFFICIENT OF THE CONSUMPTION OF AIR INTAKE OF FREE MOLECULAR FLOW CONDITIONS
I. S. Borovkov and I. D. Vershinin 21 Feb. 1975 27 p refs Transl. into ENGLISH from Uch. Zap. Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 1, no. 5, 1970 p 72-77
(AD-A008730; FTD-MT-24-0361-75) Avail: NTIS CSCL 14/2

Experimental values for the coefficient of flow rate of different coniform air intakes in a molecular wind tunnel are given. Data show that calculated and experimental values agree satisfactorily. Other data cover theoretical diffusivity of molecular reflection from the internal surface of the air intake and flow rate at relatively small averaged mass velocities of incident flow. E.H.W.

N75-30209# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
DESIGN CRITERIA FOR A RHEA TYPE ABLATION/EROSION FACILITY Interim Report, 1 May - 30 Sep. 1974
Derek G. Moore and Frank L. Wattendorf Jan. 1975 83 p refs
(AF Proj. 7065)
(AD-A008735; ARL-75-007) Avail: NTIS CSCL 14/2

Results are presented of analytical and engineering studies for a stationary model ground test facility which is capable of simulating conditions experienced by reentry vehicles during their final seconds of flight. Conventional wind tunnels are incapable of achieving the high stagnation pressures and enthalpies associated with this part of the flight trajectory; the facility concept considered here departs from convention by employing a multicomponent flow process, identified by the acronym RHEA (Reentry Heating Energies Analyzer), to achieve a high enthalpy uncontaminated air flow suitable for long duration (10 seconds) ablation/erosion testing. GRA

N75-30000 Societe Nationale Industrielle Aerospatiale, Toulouse (France).
METHODS USED FOR OPTIMIZING THE SIMULATION OF CONCORDE SST USING FLIGHT TEST RESULTS
Jacques Tardy *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 10 p (For availability see N75-29997 21-01)

N75-30089 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE TRANSONIC WIND TUNNEL AT THE INSTITUTE OF AERO AND GAS DYNAMICS OF THE STUTTGART UNIV.
E. Schmidt *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 33 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

N75-30090 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
VIBRATION ABSORBERS AND DAMPERS FOR WIND TUNNEL MODELS
G. Schwarz *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 25 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-30210*# TRW Systems Group, Redondo Beach, Calif. Materials Technology Dept.
STUDY ON PROCESSING IMMISCIBLE MATERIALS IN ZERO GRAVITY Final Report
J. L. Reger and R. A. Mendelson Jun. 1975 124 p refs
(Contract NAS8-28267)
(NASA-CR-143932; TRW-14725-6028-RU-00) Avail: NTIS HC $5.25 CSCL 11G

An experimental investigation was conducted to evaluate mixing immiscible metal combinations under several process conditions. Under one-gravity, these included thermal processing, thermal plus electromagnetic mixing, and thermal plus acoustic mixing. The same process methods were applied during free fall on the MSFC drop tower facility. The design is included of drop tower apparatus to provide the electromagnetic and acoustic mixing equipment, and a thermal model was prepared to design the specimen and cooling procedure. Materials systems studied were Ca-La, Cd-Ga and Al-Bi; evaluation of the processed samples included the morphology and electronic property measurements.

The morphology was developed using optical and scanning electron microscopy and microprobe analyses. Electronic property characterization of the superconducting transition temperatures were made using an impedance change-tuned coil method.
Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N75-30211# Royal Aircraft Establishment, Farnborough (England).
ANALYSIS OF 27 SATELLITE ORBITS TO DETERMINE ODD ZONAL HARMONICS IN THE GEOPOTENTIAL
D. G. King-hele and G. E. Cook Dec. 1973 51 p refs
(RAE-TR-73153) Avail: NTIS HC $4.25

The odd zonal harmonics in the geopotential are the terms independent of longitude and antisymmetric about the equator which define the 'pear-shape' effect. The coefficients of these harmonics were evaluated by analyzing the variations in eccentricity of 27 orbits covering a wide range of inclinations. This included 3 accurate orbits at inclinations between 60 deg and 66 deg, where the variations in eccentricity become large, and 3 near-equatorial orbits, at inclinations between 3 deg and 15 deg, whereas previously there were none at inclinations lower than 28 deg. The new data lead to much more accurate and reliable values for the coefficients. With this set of values, the pear-shape tendency of the earth amounts to 44.7 m at the poles, instead of the previous 40 m, though the new geoid is within 1 m of the old at latitudes away from the poles.
Author

N75-30212# Royal Aircraft Establishment, Farnborough (England).
SPACE VEHICLES LAUNCHED DURING 1973 AND 1974
J. A. Pilkington Jan. 1975 12 p
(RAE-TM-SPACE-219; BR46337) Avail: NTIS HC $3.25

Orbital information is given on all space vehicles successfully launched before December 31, 1974.
Author

N75-30213*# Louisiana State Univ., Baton Rouge. Reacting Fluids Lab.
COUPLED RADIATING SHOCK LAYERS WITH FINITE RATE CHEMISTRY EFFECTS. PART 2: ANALYSIS OF THE INTERACTION OF ABLATING PROTECTION SYSTEMS AND STAGNATION REGION HEATING
Ralph W. Pike, Richard C. Farmer, and John F. Balhoff 1 Jun. 1975 462 p refs
(Grant NGR-19-001-059)
(NASA-CR-132735) Avail: NTIS CSCL 22A

The conservation equations that describe the mass, momentum, and energy transfer in the shock layer around an ablating blunt body were developed and placed into numerical solution form. Effects of line and continuum radiation along with finite rate chemistry were considered. Sixteen chemical reactions with 19 chemical species were included in the analysis, and 12 of these species were employed in a radiative flux divergence calculation. The shock layer was coupled to a phenolic-nylon charring ablator through a surface energy balance. Results show that the numerical solution of the quasilinearized conservation equations yields stable and accurate solutions to the nonequilibrium, radiating shock layer surrounding a blunt reentry body.
Author

N75-30214# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE DISRUPTIVE NATURE OF THE ANALOG OF SEPARATRICES DURING THE MOTION OF ASYMMETRIC BODY ABOUT THE CENTER OF MASS IN THE ATMOSPHERE
V. V. Laricheva 20 Feb. 1975 34 p refs Transl. into ENGLISH from Uch. Zap., Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 3, no. 3, 1972 p 72-79
(AD-A008734; FTD-MT-24-0330-75) Avail: NTIS CSCL 16/2

Analytical formulas are given for the description of plane rotation about the center of mass of an asymmetric body; these are suitable for determining the torque moment of capture (the boundary of the transition of rotary motion into aperiodic or oscillatory). The number of revolutions and time during capture were determined, and the dependence of the initial angular rate of rotation on the initial angle of attack is discussed. It is shown that the analog of separatrices both in the range of its continuity and at the points of discontinuity can be determined by the proposed formulas.
M.J.S.

N75-30215# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN AUTOMATIC MISSION PLANNING AND FEASIBILITY EVALUATION ALGORITHM FOR THE SPACE SHUTTLE M.S. Thesis
Vernon S. Ritchey Dec. 1974 133 p refs
(AD-A008663; GE/EE/74-59) Avail: NTIS CSCL 22/1

An automated preliminary mission design and feasibility evaluation algorithm was developed for the orbital phase of a space shuttle mission. The mission design philosophy was based on selecting mission event times and orbital parameters to minimize the orbital plane changes required for mission completion. The feasibility evaluation was performed by simulating the mission trajectories to determine the propellant required for the orbital maneuvers. For demonstration purposes, the algorithm was coded in CDC FORTRAN 4 Extended and implemented on a CDC Cyber 74 computer system. This implementation used first order earth oblateness effects for mission planning and a Vinti earth gravity model for trajectory propagation. Orbital maneuver calculations were performed with either the Vinti model or the simple point mass earth model (user option).
GRA

N75-30216# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECTIVENESS OF THE USE OF AN AERODYNAMIC LIFT WITH DESCENT IN THE ATMOSPHERE OF MARS
N. M. Ivanov and A. I. Martynov 19 Feb. 1975 29 p refs Transl. into ENGLISH from Uch. Zap. Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 3, no. 3, 1972 p 80-85
(AD-A008807; FTD-MT-23-0331-75) Avail: NTIS CSCL 22/1

Two limiting cases of a reduction in the descent vehicle in the atmosphere of Mars were examined: descent with constant lift-drag ratio, and descent with the optimum control of aerodynamic lift. A numerical analysis is included, and it is shown that it is necessary to evaluate energy expenditures on active braking and by weight of descent control system before a descent method can be chosen.
M.J.S.

N75-30217# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF THE PASSAGE OF ROTARY MOTION INTO OSCILLATORY UPON THE ATMOSPHERIC ENTRY OF THE UNGUIDED BALLISTIC BODY
V. A. Popov and G. E. Kuzmak 26 Feb. 1975 31 p refs Transl. into ENGLISH from Uch. Zap. Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 1, no.6, 1970 p 82-90
(AD-A008733; FTD-MT-24-0375-75) Avail: NTIS CSCL 16/4

Analysis of known analytical solutions and detailed numerical investigation is carried out for a sinusoidal moment characteristic. Basic parameters are isolated and probabilistic estimations are obtained of altitude and angle of attack at the moment of the passage of rotation to oscillations during the even distribution of values of angle of attack on the boundary of the atmosphere.
GRA

N75-30218# Aerospace Corp., El Segundo, Calif.
CONTINUOUS ZONAL COVERAGE: A GENERALIZED ANALYSIS
R. D. Luders and L. J. Ginsberg 1 Aug. 1974 19 p refs
(Contract F04701-74-C-0075)
(AD-A003758; TR-0075(5901-03)-1; SAMSO-TR-74-263) Avail: NTIS CSCL 22/3

An analytical solution is obtained to the problem of achieving continuous coverage of latitudinally bounded zones of the globe by systems of common-altitude satellites equally distributed among and evenly spaced within identically inclined orbits that are symmetrically arranged about the polar axis.
GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-30219 Royal Aircraft Establishment, Farnborough (England).
SPIN DECAY AND SPIN AXIS DRIFT OF THE SATELLITE PROSPERO
V. W. Adams Aug. 1973 13 p refs
(RAE-TM-SPACE-200; BR37554) Avail: Issuing Activity

Eddy current torques responsible for the spin decay of the Prospero satellite are discussed. A qualitative description is given of the effect of spin axis drift on the exponential spin decay. The small sinusoidal variation may be assigned to changes in the day average value of the component of the geomagnetic induction normal to the spin axis. ESRO

N75-30220*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE COMMUNICATIONS TECHNOLOGY SATELLITE AND THE ASSOCIATED GROUND TERMINALS FOR EXPERIMENTS
David L. Wright and J. W. B. Day (Commun. Res. Centre) 1975 17 p refs Presented at the Conf. on Commun. Satellites for Health and Educ., Denver, 21-23 Jul. 1975; sponsored by AIAA
(NASA-TM-X-71761; E-8413) Avail: NTIS HC $3.25 CSCL 22B

General spacecraft operational characteristics of the Communications Technology Satellite are discussed with particular emphasis on communication system parameters. Associated used ground terminals are reviewed. Wideband communications are also discussed. Author

N75-30221*# Wisconsin Univ., Madison. Space Science and Engineering Center.
METEOROLOGICAL MEASUREMENTS FROM SATELLITE PLATFORMS Annual Scientific Report, 1973-1974
Verner E. Suomi Mar. 1975 93 p refs
(Contract NAS5-21798)
(NASA-CR-144669) Avail: NTIS HC $4.75 CSCL 22A

The stability of stochastic satellites and the stability and control of flexible satellites were investigated. The effects of random environmental torques and noises in the moments of inertia of spinning and three-axes stabilized satellites were first compared analytically by four methods and by analog simulations. Among the analytical methods, it was shown that the Fokker-Planck formulation yields predictions which most coincide with the simulation results. It was then shown that the required stability criterion of a satellite is quite different from that obtained by a deterministic approach, under the assumption that the environmental and control torques experienced by the satellite are random. Finally, it was demonstrated that, by monitoring the deformations of the flexible elements of a satellite, the effectiveness of the satellite control system can be increased considerably. Y.J.A.

N75-30222*# Kanner (Leo) Associates, Redwood City, Calif.
SPACE INDICATOR: OPTICAL STUDIES OF THE ATMOSPHERE
A. M. Obukhov, ed. and V. M. Kovtunenko, ed. Washington NASA Aug. 1975 566 p refs Transl. into ENGLISH from the book "Kosmicheskaya Strela: Opticheskiye Issledovaniya Atmosfery" Moscow, Nauka press, 1974 p 1-327
(Contract NASw-2481)
(NASA-TT-F-16265) Avail: NTIS HC $13.00 CSCL 22C

A compilation of scientific studies on artificial satellites of the Kosmos series is presented. Topics discussed are: (1) satellite orbits and their mathematical determination; (2) satellite instrumentation for observation of the earth's atmosphere and solar radiation; (3) satellite design and engineering; and (4) gyroaerodynamic orientation systems for satellites. Satellite configurations are shown. J.R.T.

N75-30223# Old Dominion Systems, Inc., Gaithersburg, Md.
GEOPOTENTIAL DETERMINATION FROM SATELLITE TRACKING AND SATELLITE ALTIMETRY, SUPPLEMENT 1 Final Report
J. G. Hartwell, G. E. Morduch, and F. M. Loveless Mar. 1975 39 p
(Contract DAAK02-73-C-0455)
(AD-A006207; ETL-CR-74-21-Suppl-1) Avail: NTIS CSCL 08/5

This report is a supplement to a report entitled Geopotential Determination From Satellite To Satellite Tracking and Satellite Altimetry, ETL-CR-74-21, February, 1975. Under appropriate circumstances (as reported in the final report) it has been found that when conservation of energy principles are used in determination of spherical harmonic coefficients of the earth's gravity field, a diagonal set of normal equations is generated. Test results are presented which indicate that perturbations due to extraterrestrial and nonconservative forces may be isolated so that these forces will not contaminate the conservation of energy solution. Uncertainties in gravitational anomalies and deflections of the vertical as a function of uncertainties in the determined spherical harmonic coefficients are given. These uncertainties are given when the spherical harmonic coefficients are determined from conservation of energy principles and from conservation of energy principles augmented with satellite altimetry. In the latter case a reduction by a factor of about thirty in the surface gravity standard deviation is realized when satellite to satellite tracking is augmented with satellite altimetry. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N75-30224# Joint Publications Research Service, Arlington, Va.
DATA COMPRESSION DURING TELEMETRY
Yu. B. Olkhovskiy, O. N. Novoselov, and A. P. Manovtsev 8 Aug. 1975 322 p refs Transl. into ENGLISH of the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 303 p
(JPRS-65415) Avail: NTIS HC $9.25

Information on the problem of telemetry data compression is presented. Questions are discussed from the engineering viewpoint which pertain to quasireversible methods of data compression that ensure subsequent recovery of the telemetering parameters. For individual titles, see N75-30225 through N75-30231.

N75-30225 Joint Publications Research Service, Arlington, Va.
PROBLEMS AND GENERAL CHARACTERISTICS OF DATA COMPRESSION TECHNOLOGY IN MODERN TELEMETRY
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 7-44 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 38 p (For availability see N75-30224 21-17)

The problem of telemetry data compression is analyzed in terms of information theory. Irreversible and quasi-reversible methods of data compression are discussed. Principles for constructing adaptive data compression algorithms and criteria for evaluating these algorithms are given. Methods of quasi-reversible compression are classified based on several criteria. D.M.L.

N75-30226 Joint Publications Research Service, Arlington, Va.
REPRESENTATION OF TELEMETERING FUNCTIONS
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 45-118 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 72 p (For availability see N75-30224 21-17)

The results of a mathematical investigation pertaining to the construction of optimal base functions for telemetry data compression are presented. Both nonorthogonal and orthogonal functions were considered. It was determined that orthogonal canonical expansion is the optimal representation of random processes. D.M.L.

N75-30227 Joint Publications Research Service, Arlington, Va.
ALGORITHMS FOR DATA COMPRESSION WITH ONE-PARAMETER ADAPTATION
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 119-156 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 38 p (For availability see N75-30224 21-17)

The construction of zero and single order telemetry data compression algorithms with adaptation for the interval of approximation is discussed. Comparison of the coefficients of compression for different algorithms indicates that interpolation methods yield the best results. In addition, methods for the recovery of data compression processes are listed and a telemetry transmission system which includes a data compression device is modeled. D.M.L.

N75-30228 Joint Publications Research Service, Arlington, Va.
DATA COMPRESSION ALGORITHMS WITH TWO-PARAMETER ADAPTATION
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 157-194 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 38 p (For availability see N75-30224 21-17)

Telemetry data compression algorithms for two parameter adaptation are described which are based on the Newtonian interpolation formula, Legendre functions, and eigenfunctions. The advantages and disadvantages of each method are cited, and the algorithms are evaluated on the basis of compression coefficients. D.M.L.

N75-30229 Joint Publications Research Service, Arlington, Va.
QUESTIONS IN THE TECHNICAL MODELING OF DATA COMPRESSION ALGORITHMS WITH TWO-PARAMETER ADAPTATION
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 195-225 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 31 p (For availability see N75-30224 21-17)

Modeling of telemetry data compression devices for use with different compression algorithms is discussed. Computer system specifications were determined on the basis of the operational requirements of the algorithms. The number of computer operations required per coordinate, computer memory capacity, word length, and speed of response were considered. D.M.L.

N75-30230 Joint Publications Research Service, Arlington, Va.
MODELING DATA COMPRESSION ALGORITHMS
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 226-251 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 24 p (For availability see N75-30224 21-17)

Modeling of stationary random processes, nonstationary random processes, and a segment of the real control parameter is considered. Computer programs for data compression algorithms with two parameter adaptation are also described. D.M.L.

N75-30231 Joint Publications Research Service, Arlington, Va.
ADAPTIVE MULTICHANNEL TELEMETRY SYSTEMS
In its Data Compression During Telemetry (JPRS-65415) 8 Aug. 1975 p 252-275 Transl. into ENGLISH from the book "Szhatiye Dannykh pri Teleizmereniyakh" Moscow, Sovetskoye Radio, 1971 20 p (For availability see N75-30224 21-17)

Two approaches to the construction of adaptive telemetry systems are discussed: (1) continuous regulation of sampling and (2) preliminary discretization of the telemetering parameter and subsequent exclusion from the references arriving at the compression device. Examples are given of existing adaptive telemetry systems, and the economic advantages of such systems are outlined. D.M.L.

N75-30232*# TRW Systems Group, Redondo Beach, Calif.
THE DESIGN OF A DIGITAL VOICE DATA COMPRESSION TECHNIQUE FOR ORBITER VOICE CHANNELS Final Report
Aug. 1975 40 p refs
(Contract NAS9-14416)
(NASA-CR-144410; TRW-27165) Avail: NTIS HC $3.75 CSCL 17B

Voice bandwidth compression techniques were investigated to anticipate link margin difficulties in the shuttle S-band communication system. It was felt that by reducing the data rate on each voice channel from the baseline 24 (or 32) Kbps to 8 Kbps, additional margin could be obtained. The feasibility of such an alternate voice transmission system was studied. Several factors of prime importance that were addressed are: (1) achieving high quality voice at 8 Kbps; (2) performance in the presence of the anticipated shuttle cabin environmental noise; (3) performance in the presence of the anticipated channel error statistics; and (4) minimal increase in size, weight, and power over the current baseline voice processor. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-30233*# Aerospace Corp., El Segundo, Calif. Advanced Orbital Systems Div.
OPERATIONS ANALYSIS (STUDY 2.1). VOLUME 1: EXECUTIVE SUMMARY Final Report
R. R. Wolfe 21 Feb. 1975 32 p refs
(Contract NASw-2575)
(NASA-CR-143354; ATR-74(7341)-8-Vol-1) Avail: NTIS HC $3.75 CSCL 22B

Subjects related to future STS operations concepts were investigated. The majority of effort was directed at assessing the benefits of automated space servicing concepts as related to improvements in payload procurement and shuttle utilization. Another subject was directed at understanding shuttle upper stage software development and recurring costs relative to total program projections. Space serving of automated payloads is addressed by examining the broad spectrum of payload applica-

tions with the belief that shared logistic operations will be a major contributor to reduction of future program costs. However, there are certain requirements for support of payload operations, such as availability of the payload, that may place demands upon the shuttle fleet. Because future projections of the NASA Mission Model are only representative of the payload traffic, it is important to recognize that it is the general character of operations that is significant rather than service to any single payload program. Author

N75-30234*# Chrysler Corp., New Orleans, La. Space Div.
AERODYNAMIC RESULTS OF A SEPARATION EFFECTS TEST (IA87) ON A 0.01-SCALE MODEL (52-OTS) OF THE INTEGRATED SSV IN THE AEDC/VKF 40-BY-40 INCH SUPERSONIC WIND TUNNEL A, VOLUME 2
J. H. Campbell, II (Rockwell Intern. Corp., Downey, Calif.) Jun. 1975 583 p ref
(Contract NAS9-13247)
(NASA-CR-141542; DMS-DR-2192-Vol-2) Avail: NTIS HC $13.25 CSCL 22B

Data tables, model figures, and tabulated source data are given for aerodynamic investigations of separation effects in the integrated space shuttle vehicle. For Volume 1, see N75-28101. M.J.S.

N75-30235*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FOUR METHODS OF ATTITUDE DETERMINATION FOR SPIN-STABILIZED SPACECRAFT WITH APPLICATIONS AND COMPARATIVE RESULTS
Gene A. Smith Washington Aug. 1975 72 p refs
(NASA-TR-R-445; G-7522) HC $4.25 CSCL 22A

The attitude of a spacecraft is determined by specifying independent parameters which relate the spacecraft axes to an inertial coordinate system. Sensors which measure angles between spin axis and other vectors directed to objects or fields external to the spacecraft are discussed. For the spin-stabilized spacecraft considered, the spin axis is constant over at least an orbit, but separate solutions based on sensor angle measurements are different due to propagation of errors. Sensor-angle solution methods are described which minimize the propagated errors by making use of least squares techniques over many sensor angle measurements and by solving explicitly (in closed form) for the spin axis coordinates. These methods are compared with star observation solutions to determine if satisfactory accuracy is obtained by each method. Author

N75-30236*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF CONVECTIVE HEATING TESTS OF A LONGITUDINAL GAP ON THE ROCKWELL FLAT PLATE MODEL (15-0, INSERT 7) IN THE NASA/AMES RESEARCH CENTER
M. Quan (Rockwell Intern. Corp., Downey, Calif.) and William K. Lockman (NASA. Ames Res. Center, Moffett Field, Calif.) Jul. 1975 414 p refs
(Contract NAS9-13247)
(NASA-CR-141539; DMS-DR-2250) Avail: NTIS HC $10.50 CSCL 22B

Results are presented which were obtained from tests in a hypersonic wind tunnel to determine aerodynamic heating rates in a gap running parallel or slightly askew to the flow direction. The model used was a flat plate instrumented in thin-skin sections with chromelconstantan thermocouples. Heating rate profiles lengthwise along and down into the gap were obtained, and additional data were obtained from a total temperature probe and rake fabricated during the test to investigate an apparent aerodynamic cooling trend in the gap. Model variables were width, depth, length, and orientation of the gap relative to the flow direction. The tests were conducted at Mach 5.1 and Reynolds numbers per foot of 500,000, 1,000,000, and 2,000,000. Author

N75-30237*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF INVESTIGATIONS ON AN 0.015-SCALE MODEL (49-0) OF THE ROCKWELL INTERNATIONAL SPACE SHUTTLE ORBITER IN THE NASA-AMES RESEARCH CENTER 3.5-FOOT HYPERSONIC WIND TUNNEL (0A98)
Morris D. Milam (Rockwell International Corp., Downey, Calif.) and Tom J. Dzuibala (Rockwell International Corp., Downey, Calif.) Jul. 1975 746 p
(Contract NAS9-13247)
(NASA-CR-141550; DMS-DR-2167) Avail: NTIS HC $15.25 CSCL 22B

The results of a wind tunnel test are presented; the model used for this test was 0.015-scale 140 A/B hybrid configuration of the space shuttle orbiter. The primary test objectives were to obtain incremental data on the effects of a sting mount on base pressures and force and moment data. The increments obtained included the addition of MPS nozzles as well as the deletion of the simulated sting mount. Six-component aerodynamic force and moment data were recorded over an angle of attack range from 12 to 42 degrees at 0 and 5 degrees angles of sideslip. The testing was accompliished at Mach 5.3 and Mach 10.3. The effects of various elevon, body flap, and speed brake settings were investigated, and static pressures were measured at the fuselage base for use in force-data reduction. Author

N75-30238*# Chrysler Corp., New Orleans, La. Data Management Services.
AERODYNAMIC RESULTS OF A SEPARATION EFFECTS TEST CONDUCTED IN THE AEDC 40 BY 40 INCH TUNNEL A FACILITY ON THE ROCKWELL INTERNATIONAL LAUNCH CONFIGURATION 3 (MODEL-OTS) INTEGRATED VEHICLE (IA13), VOLUME 1
J. H. Campbell, II (Rockwell Intern. Corp., Downey, Calif.) Jul. 1975 958 p ref 3 Vol.
(Contract NAS9-13247)
(NASA-CR-134117; DMS-DR-2062-Vol-1) Avail: NTIS HC $2.25 CSCL 22B

Experimental aerodynamic investigations were conducted from July 5 through July 17, 1973, on a 0.01 scale model. The AEDC captive trajectory system was utilized in conjunction with the tunnel primary sector to obtain grid-type data for external tank abort from the orbiter, and for nominal separation of one solid rocket booster from the orbiter-tank combination. Booster separation was investigated with and without separation motors plume simulation. The plumes were generated by eight M sub j = 2.15 nozzles using a 1500 psia cold air supply. Free stream data were obtained for all models (orbiter, tank, orbiter-tank, and right-hand booster) to provide baselines for evaluation of proximity effects. Author

N75-30239*# Chrysler Corp., New Orleans, La. Data Management Services.
AERODYNAMIC RESULTS OF A SEPARATION EFFECTS TEST CONDUCTED IN THE AEDC 40 BY 40 INCH TUNNEL A FACILITY ON THE ROCKWELL INTERNATIONAL LAUNCH CONFIGURATION 3 (MODEL 32-OTS) INTEGRATED VEHICLE (IA13), VOLUME 2
J. H. Campbell, II (Rockwell Intern. Corp., Downey, Calif.) Jul. 1975 668 p ref 3 Vol.
(Contract NAS9-13247)
(NASA-CR-134118; DMS-DR-2062-Vol-2) Avail: NTIS HC $15.25 CSCL 22B

Data figures are presented of the results of aerodynamic investigations conducted on the separation effects in the space shuttle integrated vehicle. For Vol. 1, see N75-30238. M.J.S.

N75-30240*# Chrysler Corp., New Orleans, La. Data Management Services.
AERODYNAMIC RESULTS OF A SEPARATION EFFECTS TEST CONDUCTED IN THE AEDC 40 BY 40 INCH TUNNEL A FACILITY ON THE ROCKWELL INTERNATIONAL LAUNCH CONFIGURATION 3 (MODEL 32-OTS) INTEGRATED VEHICLE (IA13), VOLUME 3
J. H. Campbell, II (Rockwell Intern. Corp., Downey, Calif.) Jul. 1975 651 p 3 Vol.
(Contract NAS9-13247)
(NASA-CR-141801; DMS-DR-2062-vol-3) Avail: NTIS HC $15.25 CSCL 22B

Tabulated source data are presented of the results of aerodynamic investigations conducted on the separation effects in the space shuttle integrated vehicle. For Vol. I, see N75-30238. M.J.S.

N75-30241*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
A LEADING EDGE HEATING ARRAY AND A FLAT SURFACE HEATING ARRAY: FINAL DESIGN Final Report, 26 Jun. 1974 - 10 Jul. 1975
10 Jul. 1975 97 p
(Contract NAS9-14041)
(NASA-CR-144390; MDC-E1232; JSC-09490) Avail: NTIS HC $4.75 CSCL 22B

A heating array is described for testing full-scale sections of the leading edge and lower fuselage surfaces of the shuttle. The heating array was designed to provide a tool for development and acceptance testing of leading edge segments and large flat sections of the main body thermal protection system. The array was designed using a variable length module concept to meet test requirements using interchangeable components from one test configuration in another configuration. Heat generating modules and heat absorbing modules were employed to achieve the thermal gradient around the leading edge. A support was developed to hold the modules to form an envelope around a variety of leading edges; to supply coolant to each module; the support structure and to hold the modules in the flat surface heater configuration. An optical pyrometer system mounted within the array was designed to monitor specimen surface temperatures without altering the test article's surface. Author

N75-30242*# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
SPACE SHUTTLE ORBITER MECHANICAL REFRIGERATION SYSTEM Final Report
J. L. Williams 14 Oct. 1974 53 p refs
(Contract NAS9-12055)
(NASA-CR-144395; T122-RP-038) Avail: NTIS HC $4.25 CSCL 22B

A radiator/condenser was designed which is efficient in both condensation (refrigeration) and liquid phase (radiator) operating modes, including switchover from the refrigeration mode to the radiator mode and vice versa. A method for predicting the pressure drop of a condensing two-phase flow in zero-gravity was developed along with a method for predicting the flow regime which would prevail along the condensation path. The hybrid refrigeration system was assembled with the two radiator/condenser panels installed in a space environment simulator. The system was tested under both atmospheric and vacuum conditions. Results of the tests are presented. J.M.S.

N75-30243*# Rensselaer Polytechnic Inst., Troy, N.Y. School of Engineering.
ANALYSIS AND DESIGN OF A CAPSULE LANDING SYSTEM AND SURFACE VEHICLE CONTROL SYSTEM FOR MARS EXPLORATION Progress Report, 1 Jul. 1974 - 30 Jun. 1975
D. G. Gisser, D. K. Frederick, P. K. Lashmet, G. N. Sandor, C. N. Shen, and S. Y. Yerazunis 30 Jun. 1975 167 p refs
(Grant NGL-33-018-091)
(NASA-CR-143374; RPI-TR-MP-48) Avail: NTIS HC $6.25 CSCL 22B

Problems related to an unmanned exploration of the planet Mars by means of an autonomous roving planetaty vehicle are investigated. These problems include: design, construction and evaluation of the vehicle itself and its control and operating systems. More specifically, vehicle configuration, dynamics, control, propulsion, hazard detection systems, terrain sensing and modelling, obstacle detection concepts, path selection, decision-making systems, and chemical analyses of samples are studied. Emphasis is placed on development of a vehicle capable of gathering specimens and data for an Augmented Viking Mission or to provide the basis for a Sample Return Mission. Author

N75-30244*# Martin Marietta Corp., Denver, Colo.
SS/RCS SURFACE TENSION PROPELLANT ACQUISITION/EXPULSION TANKAGE TECHNOLOGY Final Report
Aug. 1975 278 p refs
(Contract NAS9-13709)
(NASA-CR-144412; MCR-75-171) Avail: NTIS HC $8.75 CSCL 22B

The analysis, design, fabrication, and testing of a propellant tank that satisfies the requirements of the space shuttle is presented. This mission presents very stringent and sometimes conflicting requirements. A compartmented-tank device was developed and various ground and drop tower test techniques were employed to verify the design using both subscale and full-scale hardware. Performance was established with scale models and further substantiation was obtained with the full-scale tankage. Fabrication, acceptance, fill and drain, inspection, and other ground handling procedures were developed. Author

N75-30245*# Martin Marietta Corp., Denver, Colo.
LIGHTWEIGHT THERMALLY EFFICIENT COMPOSITE FEEDLINES FOR THE SPACE TUG CRYOGENIC PROPULSION SYSTEM Final Report, Aug. 1973 - May 1975
D. E. Spond Aug. 1975 127 p refs
(Contract NAS3-17796)
(NASA-CR-134870; Rept-04236) Avail: NTIS HC $5.75 CSCL 22B

Six liquid hydrogen feedline design concepts were developed for the cryogenic space tug. The feedlines include composite and all-metal vacuum jacketed and nonvacuum jacketed concepts, and incorporate the latest technological developments in the areas of thermally efficient vacuum jacket end closures and standoffs, radiation shields in the vacuum annulus, thermal coatings, and lightweight dissimilar metal flanged joints. The feedline design concepts are evaluated on the basis of thermal performance, weight, cost, reliability, and reusability. Design concepts were proved in a subscale test program. Detail design was completed on the most promising composite feedline concept and an all-metal feedline. Three full scale curved composite feedlines and one all-metal feedline assembly were fabricated and subjected to a test program representative of flight hardware qualification. The test results show that composite feedline technology is fully developed. Composite feedlines are ready for space vehicle application and offer significant reduction in weights over the conventional all-metal feedlines presently used. Author

N75-30246*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF AEROTHERMODYNAMIC HEATING TESTS ON A 0.013-SCALE MODEL SOLID ROCKET BOOSTER IN THE NASA/LaRC UNITARY PLAN WIND TUNNEL (SH12F)
Edwin B. Brewer (NASA. Marshall Space Flight Center) Jul. 1975 224 p ref
(Contract NAS9-13247)
(NASA-CR-141802; DMS-DR-2216) Avail: NTIS HC $7.25 CSCL 22B

A 0.013 scale model of the solid rocket booster (SRB) used to launch the space shuttle was tested at a Mach number of 3.7 and Reynolds numbers of 1,500,000 and 3,500,000 per foot. The objective of the test was to obtain aerodynamic heat transfer data on the surface of scaled models of the SRB at simulated full scale reentry flight conditions. Three separate models were utilized to measure film coefficients over an angle of attack range from 0 deg to 180 deg at 0 deg sideslip. All three models were representations of the MCR0200 baseline configuration and varied only by the way they were mounted in the tunnel. Model A, sting mounted thru the model base, was utilized for testing between 0 deg and 40 deg angle of attack. Model B was blade mounted from the top of the model and was tested between 60 deg and 120 deg angle of attack. Model C was sting mounted thru the model nose and utilized for testing between 140 deg and 180 deg angle of attack. Author

N75-30247*# Chrysler Corp., New Orleans, La. Space Div.
RESULTS OF INVESTIGATIONS ON A 0.010-SCALE 140A/B CONFIGURATION SPACE SHUTTLE VEHICLE ORBITER MODEL 72-0 IN THE NASA/LANGLEY RESEARCH CENTER CONTINUOUS FLOW HYPERSONIC TUNNEL (OA90)
P. J. Hawthorne (Rockwell Intern. Corp., Downey, Calif.) Aug. 1975 162 p
(Contract NAS9-13247)
(NASA-CR-141805; DMS-DR-2149) Avail: NTIS HC $6.25 CSCL 22B

Data are documented which were obtained during wind tunnel tests. The test was conducted beginning 4 March and ending 6 March 1974 for a total of 24 occupancy hours. all test runs were conducted at a Mach number of 10.3 and at Reynolds numbers of 0.65, 1.0 and 1.33 million per foot. Only the complete 140A/B was tested with various elevon, speedbrake, and bodyflap

settings at angles of attack from 12 to 37 degrees at 0 and -5 degrees of beta, and from 0 to -9 degrees of beta at 20 and 30 degrees angle of attack. The purpose was to obtain hypersonic longitudinal and lateral-directional stability and control characteristics of the updated space shuttle vehicle configuration. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

N75-30248*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
EXPERIMENTAL INVESTIGATIONS OF ARGON AND XENON ION SOURCES Annual Report, 1 Jul. 1974 - 30 Jun. 1975
Harold R. Kaufman Jun. 1975 72 p refs
(Grant NsG-3011)
(NASA-CR-134845) Avail: NTIS HC $4.25 CSCL 21C

The multipole thruster was used to investigate the use of argon and xenon propellants as possible alternatives to the electric thruster propellants of mercury and cesium. The multipole approach was used because of its general high performance level. The design employed, using flat and cylindrical rolled sections of sheet metal, was selected for ease of fabrication, design, assembly, and modification. All testing was conducted in a vacuum facility and the pumping was accomplished by a 0.8 m diffusion pump together with liquid nitrogen cooled liner. Minimum discharge losses were in the 200-250 ev. ion range for both argon and xenon. Flatness parameters were typically in the 0.70-0.75 range. Author

N75-30249*# Rocketdyne, Canoga Park, Calif.
ORBITAL MANEUVERING ENGINE FEED SYSTEM COUPLED STABILITY INVESTIGATION
D. R. Kahn, M. D. Schuman, J. K. Hunting, and K. W. Fertig
1 Sep. 1975 143 p refs
(Contract NAS9-14315)
(NASA-CR-144409; R-9807; MA-129) Avail: NTIS HC $5.75 CSCL 22B

A digital computer model used to analyze and predict engine feed system coupled instabilities over a frequency range of 10 to 1000 Hz was developed and verified. The analytical approach to modeling the feed system hydrodynamics, combustion dynamics, chamber dynamics, and overall engineering model structure is described and the governing equations in each of the technical areas are presented. This is followed by a description of the generalized computer model, including formulation of the discrete subprograms and their integration into an overall engineering model structure. The operation and capabilities of the engineering model were verified by comparing the model's theoretical predictions with experimental data from an OMS-type engine with a known feed system/engine chugging history. Author

N75-30250*# AiResearch Mfg. Co., Torrance, Calif.
H2O2 SPACE SHUTTLE APU Final Report
29 Apr. 1975 222 p refs
(Contract NAS3-15708)
(NASA-CR-134784; AiResearch-75-11290) Avail: NTIS HC $7.25 CSCL 21E

A cryogenic H2-O2 auxiliary power unit (APU) was developed and successfully demonstrated. It has potential application as a minimum weight alternate to the space shuttle baseline APU because of its (1) low specific propellant consumption and (2) heat sink capabilities that reduce the amount of expendable evaporants. A reference system was designed with the necessary heat exchangers, combustor, turbine-gearbox, valves, and electronic controls to provide 400 shp to two aircraft hydraulic pumps. Development testing was carried out first on the combustor and control valves. This was followed by development of the control subsystem including the controller, the hydrogen and oxygen control valves, the combustor, and a turbine simulator. The complete APU system was hot tested for 10 hr with ambient and cryogenic propellants. Demonstrated at 95 percent of design power was 2.25 lb/hp-hr. At 10 percent design power, specific propellant consumption was 4 lb/hp-hr with space simulated exhaust and 5.2 lb/hp-hr with ambient exhaust. A 10 percent specific propellant consumption improvement is possible with some seal modifications. It was demonstrated that APU power levels could be changed by several hundred horsepower in less than 100 msec without exceeding allowable turbine inlet temperatures or turbine speed. Author

N75-30251*# Rocket Research Corp., Seattle, Wash.
MONOPROPELLANT ENGINE INVESTIGATION FOR SPACE SHUTTLE REACTION CONTROL SYSTEM, VOLUME 1 Final Report
18 Apr. 1975 160 p refs
(Contract NAS8-28950)
(NASA-CR-144415; Rept-75-R-460-Vol-1) Avail: NTIS HC $6.25 CSCL 21H

The results are presented of an investigation to determine the capability of a monopropellant hydrazine thruster to meet the requirements specified for the space shuttle reaction control system (RCS). Of those requirements, the major concern was whether the 100,000 seconds life could be achieved at thrust levels within the specified range. Although burn times in excess of 200,000 seconds have been demonstrated at low thrust levels, the corresponding total impulse values have been substantially lower than that required for the space shuttle RCS. Two other areas of concern, involving the catalyst, were: (1) the effects of the relatively high vehicle vibration levels on catalyst attrition and (2) the effect of exposure of the catalyst to air during atmospheric reentry of the vehicle. Author

N75-30252*# Rocket Research Corp., Seattle, Wash.
MONOPROPELLANT ENGINE INVESTIGATION FOR SPACE SHUTTLE REACTION CONTROL. VOLUME 2: DESIGN, FABRICATION, AND DEMONSTRATION TEST OF A CATALYTIC GAS GENERATOR FOR THE SPACE SHUTTLE APU Final Report
18 Apr. 1975 130 p refs
(Contract NAS8-28950)
(NASA-CR-144416; Rept-75-R-460-Vol-2) Avail: NTIS HC $5.75 CSCL 21H

The capability of a catalytic gas generator to meet the requirement specified for the space shuttle APU is established. A full-scale gas generator, designed to operate at a chamber pressure of 750 psia and a flow rate of 0.36 lbm/sec, was fabricated and subjected to three separate life test series. The nickel foam metal used for catalyst retention was investigated. Inspection of the foam metal following the first life test revealed significant degradation. Consequently an investigation was conducted to determine the mechanism of degradation and to provide an improved foam metal. Author

N75-30253*# Rocket Research Corp., Seattle, Wash.
MONOPROPELLANT ENGINE INVESTIGATION FOR SPACE SHUTTLE REACTION CONTROL SYSTEM. VOLUME 3: IMPROVEMENT OF METAL FOAM FOR CATALYST RETENTION Final Report
18 Apr. 1975 46 p refs
(Contract NAS8-28950)
(NASA-CR-144417; Rept-75-R-460-Vol-3) Avail: NTIS

HC $3.75 CSCL 21H

The retention of granular catalyst in a metal foam matrix was demonstrated to greatly increase the life capability of hydrazine monopropellant reactors. Since nickel foam used in previous tests was found to become degraded after long-term exposure the cause of degradation was examined and metal foams of improved durability were developed. The most durable foam developed was a rhodium-coated nickel foam. An all-platinum foam was found to be incompatible in a hot ammonia (hydrazine) environment. It is recommended to scale up the manufacturing process for the improved foam to produce samples sufficiently large for space shuttle APU gas generator testing. Author

N75-30254# TRW Systems Group, Redondo Beach, Calif.
MAGNETIC FIELD ANNIHILATION OF IMPULSIVE CURRENT SHEETS Interim Scientific Progress Report
C. Lee Dailey Mar. 1975 44 p refs
(Contract F44620-71-C-0031; AF Proj. 9752)
(AD-A008846; AFOSR-75-0535TR) Avail: NTIS CSCL 21/3

This report reviews the progress made in experimental studies of impulsively accelerated plasmas. All of the accelerators studied have been pulsed inductive devices. The first type used the pressure of a parallel magnetic field, confined behind a fairly diamagnetic plasma current sheet, to produce acceleration. At 1500 seconds, efficiencies of 5 and 18% were obtained without and with preionization, respectively. Much higher efficiencies with this accelerator type do not appear to be possible on a scale compatible with a practical thruster because of the inherently limited plasma conductivity. The second type of accelerator investigated used two magnetic field components. One is parallel to the current sheet, and is used to drive the plasma current by magnetic field annihilation, and the other is orthogonal to the current. GRA

N75-30255# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DETERMINATION OF THE ABSOLUTE INTENSITY OF THE SODIUM D2 EMISSION IN ROCKET PLUMES M.S. Thesis
John M. Carney Mar. 1975 62 p refs
(AD-A008658; GEP/PH/75-1) Avail: NTIS CSCL 21/8

The spectral radiance of three rocket motors doped with zero, 0.1%, and 1.0% NaCl was measured at 5890A. The spectral radiance of the plume continuum in the Fraunhofer D2 absorption band was measured also. Since the spectral radiance of the plume only quadrupled with a ten fold increase in the fuel's sodium content, self absorption in the plume is thought to be a significant broadening mechanism. The lack of a change in the continuum radiance was verified with densitometric scans of movie film taken of the firings. GRA

N75-30087 Dornier-System G.m.b.H., Friedrichshafen (West Germany).
ACCURACY REQUIREMENTS OF THRUST DIRECTION AND MOUNTING OF BOOSTER ENGINES
J. T. Heynatz and R. Kapp *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 24 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-30256* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PERFLUORO ALKYLENE DIOXY-BIS-(4-PHTHALIC ANHYDRIDES AND OXY-BIS-(PERFLIOROALKYLENOEXY-PHATHALIC ANHYDRIDES Patent
James A. Webster, inventor (to NASA) (Monsanto Res. Corp., Dayton, Ohio) Issued 12 Aug. 1975 7 p Filed 16 Jul. 1974 Supersedes N74-29479 (12 - 19, p 2246) Sponsored by NASA
(NASA-Case-MFS-22356-1; US-Patent-3,899,517; US-Patent-Appl-SN-489008; US-Patent-Class-260-346.3; US-Patent-Class-260-78TF; US-Patent-Class-260-520) Avail: US Patent Office CSCL 07C

Dianhydrides were found which when reacted with diamines provide polyimides exhibiting excellent thermal, oxidative, and hydrolytic stability and good tensile strength and elongation. There characteristics make the polyimides useful as sealants in advanced aerospace structures. Official Gazette of the U.S. Patent Office

N75-30257*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CHEMICAL REACTIONS OF METAL POWDERS WITH ORGANIC AND INORGANIC LIQUIDS DURING BALL MILLING
Alan Arias Washington Sep. 1975 27 p refs
(NASA-TN-D-8015; E-8369) Avail: NTIS HC $3.75 CSCL 07D

Chromium and/or nickel powders were milled in metal chlorides and in organic liquids representative of various functional groups. The powders always reacted with the liquid and became contaminated with elements from them. The milled powders had specific surface areas ranging from 0.14 to 37 sq m/g, and the total contamination with elements from the milling liquid ranged from 0.01 to 56 weight percent. Compounds resulting from substitution, addition, or elimination reactions formed in or from the milling liquid. Author

N75-30258# Rock Island Arsenal Lab., Ill. General Thomas J. Rodman Lab.
COMPOUNDING STUDIES ON POLYPHOSPHAZENE POLYMERS Technical Report, Jul. 1973 - May 1974
Frank B. Testroet Feb. 1975 18 p
(DA Proj. 1T1-62105-AH-84)
(AD-A009095; RIA-R-TR-75-007) Avail: NTIS CSCL 11/10

A study was undertaken to determine the effects of curatives and fillers on the physical properties of polyphosphazene polymers. In general, the addition of compounding ingredients to this type of polymer is difficult on a two-roll rubber-mixing mill. However, calcium oxide and Dow Corning FS1265 fluid functioned as processing aids to facilitate the incorporation of other compounding ingredients. Various peroxides produced crosslinking of the polymer, and Di Cup 40C was found to be the most efficacious. All vulcanizates displayed low-tensile strengths, but certain vulcanizates exhibited good low-temperature flexibility, hydrolytic stability, and resistance to ozone and a variety of fluids. GRA

N75-30259# California Univ., Los Angeles. Dept. of Chemistry.
THE SYNTHESIS OF ICOSAHEDRAL NICKELABORANES
B. Patrick Sullivan, Richard N. Leyden, and M. Frederick Hawthorne 18 Apr. 1975 10 p refs
(Contract N00014-69-A-0200-4019; NR Proj. 053-481)
(AD-A009239; TR-84) Avail: NTIS CSCL 07/3

The reaction of the organometallic reagents (c5H5)2Ni and (C5H5NiCO)2 with tetraalkylammonium salts of B11H13(2-) provides a convenient high yield route to the unknown icosahedral species, C5H5NiB11H11(-). The reaction of (C5H5NiCO)2 with the borane anion, B10H10(2-), results in insertions of two C5H5Ni-moieties into the polyhedral framework to produce the icosahedral metalloborane (C5H5Ni)2B10H10. The existence and great stabilities of these icosahedral nickelaboranes are predicted by polyhedral counting rules and furnish a pleasing example of the a priori predictive ability of these rules. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N75-30260* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
BONDING METHOD IN THE MANUFACTURE OF CONTINUOUS REGRESSION RATE SENSOR DEVICES Patent
William H. Haraway, Jr., Walter J. Dale, and Edwin A. McErlean, inventors (to NASA) Issued 12 Aug. 1975 8 p Filed 12 Dec. 1973 Supersedes N74-14141 (12 - 05, p 0540)

(NASA-Case-LAR-10337-1; US-Patent-3,898,730; US-Patent-Appl-SN-424038; US-Patent-Class-29-613; US-Patent-Class-29-610; US-Patent-Class-338-13; US-Patent-Class-338-283) Avail: US Patent Office CSCL 11D

In a method for manufacturing continuous regression rate sensor devices, at least two retaining members are derived from a phenolic-graphite or a 50:50. Phenolic-nylon material are interbonded one to another to form a cavity where an ablation regression grid sensor is positioned.

Official Gazette of the U.S. Patent Office

N75-30261 Rocket Propulsion Establishment, Westcott (England).

SUMMARY REPORT ON THE CARBON 72 CONFERENCE HELD IN BADEN-BADEN, GERMANY, JUNE 1972

A. C. Parmee Sep. 1972 31 p refs

(RPE-TM-614; BR35869) Avail: Issuing Activity

Papers covering the following main subjects are listed: pyrolysis, graphitization, intercalation, surface compounds, surface reactions, structure, physical properties, carbon and graphite reactor technology, pyrolitic carbon, carbon fibers, composites, special forms, deposits, raw materials technology, measurement and investigation methods, and technical applications. Work of potential interest in rocket engine design is included. ESRO

N75-30262*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

A STUDY OF THE OXIDE DISPERSION AND RECRYSTALLIZATION IN NiCrAl PREPARED FROM PREOXIDIZED POWDER

T. K. Glasgow 1975 33 p refs Proposed for Presentation at Fall Meeting of Am. Inst. of Mining, Met., and Petrol. Engr., Cincinnati, 10-13 Nov. 1975

(NASA-TM-X-71749; E-8389) Avail: NTIS HC $3.75 CSCL 11D

The sintered aluminum powder (SAP) technique of dispersion strengthening (formation of an oxide dispersion by preoxidation of metal powders) was applied to atomized powder of a nickel alloy containing, by weight, 17% Cr, 5% Al, and 0.2% Y. The SAP-NiCrAl alloy (without the ytterbium removed by oxdation) was worked by extrusion and rod rolling at 1205 C and by swaging at 760 C. Annealing treatments were applied after working to determine the recrystallization response. The NiCrAlY alloy, similarly prepared from atomized powder, but without a preoxidation treatment, was examined for comparison. The SAP-NiCrAl alloy exhibited oxide particle size and spacing much larger than that usually observed in oxide dispersion strengthened alloys; nonetheless, it was possible to achieve abnormal (secondary) recrystallization in the SAP-NiCrAl alloy as has been reported for other oxide dispersion strengthened alloys. In contrast, the unoxidized NiCrAlY alloy exhibited only primary recrystallization. Author

N75-30263*# Kanner (Leo) Associates, Redwood City, Calif.

REVIEW ON THE STRUCTURE OF SILICATE MELTS

Mineo Kosaka, Makoto Kato, and Itaru Shiroyanagi Washington NASA Sep. 1975 31 p refs Transl. into ENGLISH from Nagoya Kogyo Gijutsu Shikensho Hokoku (Japan), v. 22, no. 12, Dec. 1973 p 457-468

(Contract NASw-2790)

(NASA-TT-F-16540) Avail: NTIS HC $3.75 CSCL 11D

A review is presented of theoretical developments in the study of the structures of silicate melts in chronological order. These include past efforts to explain the melt structures using, among others, molecule theory, ion theory, and equilibrium theory. The introduction of the organic concentration theory and the distribution function is also covered. Recently-formulated experimental methods for the study of solid glasses was introduced and the question of their applicability to the study of high temperature silicate melts was discussed. It was concluded that further developments in theory are necessary before the melt structures can be adequately explained. Author

N75-30264*# IIT Research Inst., Chicago, Ill.

LAMINATION RESIDUAL STRESSES IN FIBER COMPOSITES Interim Report, 1 Aug. 1972 - 30 Jun. 1974

I. M. Daniel and T. Liber Mar. 1975 468 p refs

(Contract NAS3-16766)

(NASA-CR-134826; IITRI-D6073-1) Avail: NTIS HC $11.50 CSCL 11D

An experimental investigation was conducted to determine the magnitude of lamination residual stresses in angle-ply composites and to evaluate their effects on composite structural integrity. The materials investigated were boron/epoxy, boron/polyimide, graphite/low modulus epoxy, graphite/high modulus epoxy, graphite/polyimide and s-glass/epoxy. These materials were fully characterized. Static properties of laminates were also determined. Experimental techniques using embedded strain gages were developed and used to measure residual strains during curing. The extent of relaxation of lamination residual stresses was investigated. It was concluded that the degree of such relaxation is low. The behavior of angle-ply laminates subjected to thermal cycling, tensile load cycling, and combined thermal cycling with tensile load was investigated. In most cases these cycling programs did not have any measurable influence on residual strength and stiffness of the laminates. In the tensile load cycling tests, the graphite/polyimide shows the highest endurance with 10 million cycle runouts at loads up to 90 percent of the static strength. Author

N75-30265*# Carborundum Co., Niagara Falls, N.Y. Research and Development Div.

THERMAL/ACOUSTICAL AIRCRAFT INSULATION MATERIAL Final Technical Report

Edward Struzik, Raymond Kunz, and Ruey Lin May 1975 37 p

(Contract NAS9-14482)

(NASA-CR-144414) Avail: NTIS HC $3.75 CSCL 11D

Attempts made to improve the acoustical properties of low density Fiberfrax foam, an aircraft insulation material, are reported. Chacterizations were also made of the physical and thermal properties. Two methods, optimization of fiber blend composition and modification of the foam fabrication process, were examined as possible means of improving foam acoustics. Flame impingement tests were also made; results show performance was satisfactory. Author

N75-30266# Pennsylvania State Univ., University Park. Dept. of Engineering Science and Mechanics.

A GENERALIZED PLANE STRESS THEORY OF MICROSTRUCTURE FOR ANGLE-PLY LAMINATES Interim Report, 15 Sep. 1973 - 31 Dec. 1974

Jaan Kiusalaas and Bill Moustakakis Feb. 1975 49 p refs (Grant AF-AFOSR-2590-74; AF Proj. 6813; AF Proj. 9782)

(AD-A008817; AFOSR-75-0536TR) Avail: NTIS CSCL 11/4

A two-dimensional continuum theory of microstructure is developed for stress analysis of angle-ply laminates under in-plane loading. An example problem is used to evaluate the results of the theory against a reference solution obtained by the finite element method. The results are in satisfactory agreement; they also show that the in-plane stresses reach considerably higher peak values than reported in previous literature. The theory is also presented in a simplified version, which is demonstrated to be adequate for predicting interlaminar stresses and in-plane stress resultants, but does not give satisfactory results for the variation of in-plane stresses through the thickness of the laminations. GRA

N75-30267# Illinois Inst. of Tech., Chicago. Dept. of Metallurgical and Materials Engineering.

IMPACT BEHAVIOR OF HYBRID COMPOSITES Interim Report

L. J. Broutman and P. Mallick Nov. 1974 55 p refs (Grant AF-AFOSR-2214-72; AF Proj. 6813; AF Proj. 9782)

(AD-A008936; AFOSR-75-0472TR) Avail: NTIS CSCL 11/4

The flexure and impact properties of hybrid composite systems containing various high performance fibers in an epoxy matrix have been studied as a function of lamination configuration. From instrumented impact test data, fracture initiation and propagation energies were calculated and reported in terms of a parameter called Ductility Index. It was shown that with a proper choice of lamination configuration, a tremendous increase in impact energy as well as Ductility Index can be achieved in hybrid systems. Among other factors, the impact properties

also depend on the type of fiber and interlaminar shear strength. GRA

N75-30268# TRW, Inc., Cleveland, Ohio.
METAL MATRIX COMPOSITES FOR HIGH TEMPERATURE TURBINE BLADES Final Technical Report, 1 Feb. 1974 - 1 Feb. 1975
William D. Brentnall, Donald J. Maracz, and Istvan J. Toth 31 Mar. 1975 55 p refs
(Contract N00019-74-C-0122)
(AD-A009298; TRW-ER-7722-F) Avail: NTIS HC $4.25 CSCL 11/4

Continued development and evaluation of fiber-reinforced FeCrAlY composites, intended for gas turbine engine application at temperatures above 2000 F (1093 C), described. Resistance of W-1ThO2/FeCrAlY and Mo-TZM/FeCrAlY composites to thermal cycling over the temperature ranges 85-2000 F (29-1093 C and 85-2200 F (29-1204 C) was determined. The W-1ThO2-reinforced system sustained 1000 cycles at the higher peak temperature cycle without damage. Mo-TZM/FeCrAlY composites sustained 1000 cycles of T sub max = 2000 F and 100 cycles T sub max = 2200 F without damage but failed in the 1000 cycle T sub max = 2200 F test. Times-to-rupture of over 300 hours at 2100 F (1150 C) and 35 Ksi were observed for W-1ThO2/FeCrAlY composites at the 40-45 volume percent reinforcement. On a specific strength (density normalized) basis, these data represent substantial strength improvements over current D.S. eutectic systems. Relatively low creep strains were observed for the W/FeCrAlY system compared to other candidate materials. Author

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N75-30269+ Engineering Sciences Data Unit, London (England).
NORMAL MELTING POINTS, BOILING POINTS AND CRITICAL POINTS OF BRANCHED CHAIN ESTERS OF MONOBASIC ALKANOIC ACIDS
Sep. 1971 9 p refs Sponsored by Inst. of Chem. Engr.
(ESDU-71021) Avail: NTIS HC $17.00

Evaluated reference temperatures of branched chain esters are provided for use in thermophysical calculations of vapor pressures. The data are applicable from C4 to C23 compounds. Author

N75-30270 British Library Lending Div., Boston Spa (England).
ON THE SPECTROCHEMICAL INVESTIGATION OF CORROSION OR DIFFUSION ZONES OF CORRODED CLADDING MATERIALS USING A GLOW DISCHARGE LAMP
H. Schneider and H. Schumann 14 Jan. 1975 44 p refs Transl. into ENGLISH from German Report KFK 2009
(BLL-Risley-Tr-2815-(9091.9F); KFK-2009) Avail: British Library Lending Div., Boston Spa, Engl.: 5 BLL photocopy coupons

A spectrochemical method is described for analysis of the concentrations of various elements in corrosion or diffusion zones. The excitation and the removal are produced by a glow discharge lamp over a circular area 8 mm in diameter. Using this method, cladding tube samples of stainless steels were analyzed after corrosion in sodium. Preliminary investigations were made using a Fuess quartz spectrograph 110 M, and the Cr, Ni, and Mn concentrations were determined. Further investigations were conducted using a vacuum spectrometer with stationary slits for about ten elements (Fe, Cr, Ni, Mn, Co, Nb, Ti, Mo, V, B, C) and automatic measurement of the intensities. Precise working procedure is described and discussed. The concentration profiles of the elements in the diffusion zones of corrosion samples after exposure in sodium at 700 C are plotted. Author

N75-30271 British Library Lending Div., Boston Spa (England).
GAS EXPLOSIONS, THEIR ORIGIN AND EFFECTS
H. G. Wagner 22 May 1975 20 p Transl. into ENGLISH from Chem. Ingr. Tech. (West Ger.), v. 47, no. 6, 1975 p 223-230
(BLL-Risley-Tr-2860-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

The explosion of combustible gases or gas mixtures in the presence of an explosive mixture was examined. The combustion process is decisively determined by the mechanism of flame propagation and flame acceleration and by the interaction between the energy source and the flow. The processes occurring in tubes will be discussed first of all, since this is where the individual processes which influence the energy release rate can best be understood. This is followed by sections on the processes occurring in the case of explosions in containers and in the open air. Author

N75-30272+ Engineering Sciences Data Unit, London (England).
THERMAL CONDUCTIVITY OF LIQUID ALIPHATIC HYDROCARBONS. 2: ALKENES
Jun. 1975 20 p refs Revised Sponsored by Inst. of Chem. Engr. and Inst. of Mech. Engr.
(ESDU-75009) Copyright. Avail: NTIS HC $122.50

Evaluated thermal conductivity data are provided for liquid alkenes and dienes. The data are applicable in heat transfer calculations in chemical process plant design for temperatures from the melting point to 0.9 critical, at pressures from below 1 atm to 500 atm. Author

N75-30273+ Engineering Sciences Data Unit, London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. 5: HALOGENATED METHANES
Jun. 1975 31 p refs Sponsored by Inst. Chem. Engr.
(ESDU-75010) Copyright. Avail: NTIS HC $194.50

Evaluated vapor pressure data for liquid halogenated methanes are provided for use in thermophysical calculations in the design of process plants such as compressors, distillation columns, heat exchangers, liquifaction plants, and reactors. The data are applicable to halogenated methanes at pressures from 0.0001 kN/sq m to the critical point. Author

N75-30274*# Rocketdyne, Canoga Park, Calif.
FURTHER ANALYSIS OF THE EFFECTS OF BAFFLES ON COMBUSTION INSTABILITY Final Report
C. L. Oberg and M. D. Schuman Jun. 1975 32 p refs
(Contract NAS3-17821)
(NASA-CR-134832) Avail: NTIS HC $3.75 CSCL 21B

A computerized analytical model, developed to predict the effects of baffles on combustion instability, was modified in an effort to improve the ability to properly predict stability effects. The model was modified: (1) to replace a single spatially-averaged response factor by separate values for each baffle compartment; (2) to calculate the axial component of the acoustic energy flux, and (3) to permit analysis of traveling waves in a thin annular chamber. Allowance for separate average response factors in each baffle compartment was found to significantly affect the predicted results. With this modification, an optimum baffle length was predicted which gave maximum stability. Author

N75-30275# Royal Aircraft Establishment, Farnborough (England).
STUDIES OF THE KINETICS AND MECHANISM OF THE OXIDATION OF PETROLEUM HYDROCARBONS IN THE GAS PHASE. PART 9: THE BRANCHING MECHANISM IN THE GAS PHASE OF n-HEPTANE IN THE HIGHER TEMPERATURE RANGES. THE CHEMICAL NATURE OF THE COOL FLAME PHENOMENON
K. Richter, G. Ohlmann, and W. Schirmer Jun. 1975 16 p refs Transl. into ENGLISH from Z. Phys. Chem. (West Ger.), no. 253, 1973 p 217-227
(RAE-Lib-Trans-1849-Pt-9; BR48248) Avail: NTIS HC $3.25

The range of negative temperature coefficient of the reaction rate was determined from the temperature dependence of the reactant consumption. The 2,5-ketohydroperoxyheptane is the most important branching intermediate up to temperatures of around 450 C. At temperatures above this level, the branching

probably occurs via hydrogen peroxide. Acetaldehyde has no, or only slight, accelerative effect in the temperature range between 300 and 500 C. The negative temperature coefficient is produced by the reduction in formation of 2,5-ketohydroperoxyheptane, caused by increasing decomposition of the hydroperoxyheptl radicals. The mechanism of the cool flames suggested here is based upon the assumption of monomolecular branching via ketohydroperoxides, linear chain termination, and competation between molecular and radical consumption of the branching intermediate. Author

N75-30276# Royal Aircraft Establishment, Farnborough (England).
STUDY OF THE KINETICS AND MECHANISM OF THE OXIDATION OF PETROLEUM HYDROCARBONS IN THE GAS PHASE. PART 8: THE CHAIN PROPAGATION MECHANISM IN THE GAS PHASE OXIDATION OF n-HEPTANE IN THE HIGHER TEMPERATURE RANGES
K. Richter, G. Ohlmann, and W. Schirmer Jun. 1975 14 p refs Transl. into ENGLISH from Z. Phys. Chem. (West Ger.), no. 253, 1973 p 207-216
(RAE-Lib-Trans-1847-Pt-8; BR48249) Avail: NTIS HC $3.25

The slow oxidation and the cool flame oxidation of n-heptane were studied in a flow apparatus, in the temperature range between 260 and 570 C. The process of accumulation of a number of intermediate products was analytically followed in its relationship to the furnace temperature. The principle products of the slow oxidation are ketohydroperoxyheptanes, carboxylic acids, and ketones. Cool flame oxidation chiefly gives rise to cyclic ethers, olefins and aldehydes. The temperature limits of the cool flames were determined. There is some discussion of the formation mechanisms operating in the cases of the cyclic ethers, and of the lower olefins and aldehydes. Author

N75-30277*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
TABLES AND CHARTS OF EQUILIBRIUM THERMODYNAMIC PROPERTIES OF CARBON DIOXIDE FOR TEMPERATURES TO 25,000 K
Sue E. Wilder and Charles G. Miller, III Jul. 1975 490 p refs
(NASA-TM-X-72658) Avail: NTIS HC $12.00 CSCL 07D

Properties considered for the pure gas are: (1) pressure; (2)temperature,(3) density, (4) enthalpy, (5) speed of sound; (6) entropy, (7) molecular weight ratio, (8) specific heat at constant pressure; (9) specific heat at constant volume; (10) isentropic exponent and (11) species mole fractions. Author

N75-30278*# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
INVESTIGATION OF CRITICAL BURNING OF FUEL DROPLETS Semiannual Report, 1 Jan. - 30 Jun. 1975
G. M. Faeth and S. Chanin Jul. 1975 36 p
(Grant NGR-39-009-077)
(NASA-CR-143385) Avail: NTIS HC $3.75 CSCL 21B

Steady and unsteady combustion of liquid fuel droplets under rocket engine conditions was analyzed. Emphasis was placed on combustion at elevated pressures and temperatures. The results and their technical application to the design of liquid fueled rocket engines and the determination of combustion instability characteristics of these engines were summarized. Author

N75-30279# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
STRUCTURAL STUDIES OF SILICATE ANIONS IN AQUEOUS SOLUTION USING SILICON-29 NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY
G. Englehardt, H. Jancke, D. Hoebbel, and W. Wieker 1975 7 p refs Transl. into ENGLISH from Z. fuer Chem. (West Ger.), v. 14, no. 3, 1974 p 109-110
(NRC/CNR-TT-1813; ISSN-0470-2557) Avail: NTIS HC $3.25

The usefulness of silicon-29 nuclear magnetic resonances (nmr) spectroscopy studies for the constitutional analysis of condensed silicates is examined. The Si-29 nmr spectra of a few aqueous silicate solutions with varying NaOH:SiO2 ratios were recorded. Chemical shifts and the relative intensities of the Si-29 nmr signals of four sodium silicate solutions are shown. Results indicate that the method is especially useful for low-molecular systems whose condition is sensitive to slight constitutional differences in the vicinity of the Si atoms under consideration. J.M.S.

N75-30280# Witwatersrand Univ., Johannesburg (South Africa). School of Mechanical Engineering.
THE SPHERICAL BOMB METHOD FOR LAMINAR BURNING VELOCITY DETERMINATION: EQUATIONS FOR THICK FLAME PROPAGATION
A. M. Garforth and C. J. Rallis May 1975 45 p refs
(ISBN-0-85494-312-9; Rept-59) Avail: NTIS HC $3.75

An analysis of the flame propagation process in a rigid spherical constant volume vessel with central ignition is presented. This incorporates a flame front thickness which varies during propagation through the unburnt mixture. Equations for laminar burning velocity are thus derived which permit this quantity to be determined from experimental observations with the bomb method. These equations are general and are limited in their application by a lack of suitable flame thickness and temperature profile data at pressures higher than 0,1 MPa. Author

N75-30281# Research Triangle Inst., Durham, N.C.
GUIDELINES FOR DEVELOPMENT OF A QUALITY ASSURANCE PROGRAM. VOLUME 12: DETERMINATION OF PHOSPHOROUS IN GASOLINE
Daniel E. Gilbert, Denny E. Wagoner, and Franklin Smith Nov. 1974 67 p refs
(Contract EPA-68-02-1234)
(PB-240751/8; EPA-650/4-74-005-1) Avail: NTIS HC $4.25 CSCL 14B

Guidelines are presented for developing a quality assurance program for the determination of phosphorus in gasoline by the Federal reference method. These guidelines include: (1) recommended operating practices and techniques, (2) procedures for assessing performance and qualifying data, and (3) procedures for identifying trouble and improving data quality. This document is an operations manual, designed for use by laboratory personnel. GRA

N75-30282# Army Foreign Science and Technology Center, Charlottesville, Va.
EFFECT OF TEMPERATURE REGIME ON THE REMOVAL OF SULPHUR COMPOUNDS
L. G. Geraskina, K. B. Chernysheva, and E. E. Nikitin 16 May 1974 8 p Transl. into ENGLISH from Tr. Leningrad. Inzh.-Ekon. Inst. (USSR), no. 89, 1972 p 10-13
(AD-A005963; FSTC-HT-23-807-74) Avail: NTIS CSCL 07/1

The effect of the temperature regime in the adsorptive scrubbing of thermal-cracking gasoline is analyzed. Scrubbed stock quality is investigated and changes in the sulfur load of adsorbents in the specified regime are discussed. GRA

N75-30283# Purdue Research Foundation, Lafayette, Ind.
CATALYTIC PROPERTIES OF SURFACES SITES ON METAL OXIDES AND THEIR CHARACTERIZATION BY X-RAY PHOTOELECTRON SPECTROSCOPY Semiannual Technical Report, 1 Jun. - 30 Nov. 1974
R. G. Squires, L. F. Albright, W. N. Delgass, R. A. Walton, and N. Winograd 1974 57 p refs
(Contract DAHC15-73-G11; ARPA Order 2338)
(AD-A004916) Avail: NTIS CSCL 07/4

The catalytic activity and selectivity of many oxide catalysts can be varied by controlling the oxidation state of the surface oxide. The development of techniques to control and to measure the surface oxidation state (or states) would make possible novel catalysts with enhanced activity and/or dual site catalysts with unique selectivity properties. Two methods of controlling the surface states are investigated. (a) The dispersion of the active catalysts on an inactive support will be varied in hopes that the stable oxidation state at given ambient conditions will be influenced by the degree of dispersion of the catalysts. (b) Reactions at electrode surfaces will be studied in hopes that controlled potentials applied to the electrode will influence the oxidation state of the surface sites. The following report divided into three sections: Catalytic Studies, Characterization of Surface States by Electron Spectroscopy (especially X ray photoelectron spectroscopy), and Electrode Reaction Studies. GRA

N75-30284# Army Foreign Science and Technology Center, Charlottesville, Va.
PHOTOLYSIS OF AZIDES OF LEAD, SILVER, AND CERTAIN SYSTEMS BASED ON THEM
Yu. A. Zakharov, E. P. Abakumov, and E. P. Surovoi 31 Dec. 1974 9 p refs Transl. into ENGLISH from Sbornik Statei (USSR), no. 251, 1970 p 373-382
(AD-A005946; FSTC-HT-23-900-73) Avail: NTIS CSCL 07/5

A series of researchers have communicated information about the influence that the impurities coprecipitated with azides of heavy metals in the production of these azides have on the photochemical stability of azides. This paper, one of a series of researches conducted on the photolysis of azide systems, presents new results on the influence of impurities on the photochemical decomposition of PbN6 and AgN3. The kinetics of decomposition was studied by gas separation of nitrogen, the product of photolysis. GRA

N75-30285# Harry Diamond Labs., Adelphi, Md.
ANALYSIS OF THE GROUND CONFIGURATION OF 1m 3+ IN Ca WO4
Donald E. Wortman Dec. 1974 25 p refs Sponsored by the Army
(DA Proj. 1T1-61102-A-34A; HDL Proj. 370532)
(AD-A008968; HDL-TR-1663) Avail: NTIS CSCL 07/4

The energy levels of singlet D, singlet G, triplet F, and triplet H terms of Tm(3+) in CaWO4 were established by an analysis of the absorption and fluorescence spectra. The absorption lines used to establish most of the energy levels were recorded over the wavelength range from 2.5 micrometers to the band edge at about 0.3 micrometer with crystals with temperatures from 2 to 300K. Transitions to the levels of the triplet H(6) multiplet were observed in fluorescence. An energy level scheme was constructed by using electric dipole selection rules and by the aid of theoretical calculations. The calculations were made by diagonalizing a Hamiltonian that describes the free ion and the crystal field in a basis of states spanning the entire 4f(12) configuration. GRA

N75-30286# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
RELATIVE IMPORTANCE OF PRECISION AND FIDELITY CRITERIA IN DOSAGES OF TRACE ELEMENTS IMPORTANCE
R. Lapadu-Hargues Mar. 1975 9 p Transl. into ENGLISH from Colloq. Int. Cent. Nat. Rech. Sci. (Paris), no. 923, 1970 p 41-46
(AD-A009061; CRREL-TL-469) Avail: NTIS CSCL 14/2

The paper discusses the relationship between accuracy and reproducibility. The question of whether 30 rather precise analyses or only one almost perfect analysis is most valuable is developed. It is concluded in this paper that the search for reproducibility should be placed before the search for accuracy. In fact, if better reproducibility means an easy comparison of results between them this might lead to the establishment of geochemical laws. GRA

N75-30287# Picatinny Arsenal, Dover, N.J.
IGNITABILITY OF ENERGETIC COMPOSITIONS IN THE PRESENCE OF FLAMMABLE LIQUIDS
Patricia L. Farnell and Anthony J. Beardell Feb. 1975 23 p refs
(AD-A009082; PA-TR-4724) Avail: NTIS CSCL 19/1

A study was therefore performed in which selected pyrotechnic-type blends were exposed to the propagating flame of the flammable liquid. This was accomplished by use of a sealed combustion vessel in which a vapor-air mixture of known concentration (ranging over the entire flammability limit range) was ignited over a layer of loose, dry powder. Substances tested included illuminating flare, time-delay, smoke and igniter compositions. The flammable liquids were ethyl alcohol, acetone, methyl acetate and styrene. The results show that a number of compositions, especially of the igniter and delay type, are easily ignited by a transient flame. Smoke compositions appear to require an incubation period prior to ignition while flare compositions and some delay compositions failed to ignite. The ignitability of wet compositions was also evaluated via ignition in an open pan. The results of these tests indicate that the mixture will ignite only after the volatile liquid is consumed. GRA

N75-30288# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
THE EFFECT OF PRESSURE TRANSIENTS IN DIFFUSION FLAMES Interim Report, 1 Apr. 1973 - 31 Mar. 1974
Amable Linan Mar. 1975 30 p ref
(Grant AF-AFOSR-2535-73)
(AD-A008848; AFOSR-75-0546TR) Avail: NTIS CSCL 21/2

As an illustration of the effects of pressure transients on the ignition and subsequent evolution of diffusion flames, an analysis is presented of the mixing and simultaneous reactions between to semispaces of reactants subject to an arbitrary pressure transient. The chemical reaction is described in terms of an overall Arrhenius reaction with an activation energy large compared with the thermal energy in the mixing layer. After an initial inert mixing stage, there is a short ignition stage resulting in chemical equilibrium with complete consumption of one of the reactants in one plane in the mixing layer. One or two premixed flames originate at the ignition plane moving across the mixing layer, and thus establish a diffusion controlled mode of burning. GRA

N75-30289# George Washington Univ., Washington, D.C. Dept. of Chemistry.
KINETICS OF FLUORINE REACTIONS Final Report, 1 Sep. 1970 - 31 Aug. 1974
Joseph B. Levy Feb. 1975 7 p refs
(Grant AF-AFOSR-1939-70; AF Proj. 9750)
(AD-A008971; AFOSR-75-0598TR) Avail: NTIS CSCL 07/3

This report briefly summarizes research done from September 1, 1970 to November 30, 1974. Four publications resulted. The research focused on the chemistry of fluorine and its compounds. One system studied was the equilibrium of CF3OOCF3 with CF3OF plus COF2. Equilibrium constants, forward and reverse reaction rates and the standard enthalpy and entropy for this system were determined. The bond dissociation energy for the O-O bond in bistrifluoromethyl peroxide and for the O-F bond in trifluoromethyl hypofluorite were determined. The study of the fluorine with perfluorocyclobutane reaction system was also completed. This study represents the most thoroughly studied example of a homolytic bimolecular substitution reaction usually designated SH2. Reaction rates and mechanisms were determined. GRA

N75-30290# Dow Chemical Co., Midland, Mich.
EVALUATION AND COMPILATION OF THERMODYNAMIC PROPERTIES OF HIGH TEMPERATURE CHEMICAL STUDIES Final Report, 1 Jul. 1970 - 31 Dec. 1974
Malcolm W. Chase 31 Jan. 1975 22 p
(Contract F44620-70-C-0104; AF Proj. 9750)
(AD-A008960; AFOSR-75-0502TR) Avail: NTIS CSCL 07/4

A final five year summary is presented for work in this contract period which resulted in the issuance of nine supplements containing a total of 351 thermochemical tables. These supplements were made part of the JANAF thermochemical tables which now totals 1297. A complete index to the tables is included. Author (GRA)

N75-30291# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE EVALUATION OF THE FOTOSCOPE AS A SUPPLEMENT TO SOAP M.S. Thesis
Robert L. Mills Mar. 1975 113 p refs
(AD-A008674; GEP/PH/75-11) Avail: NTIS CSCL 14/2

Spectrometric oil analysis is the primary laboratory technique used by the Air Force to determine oil condition in aircraft engines. The Fotoscope is an instrument that is used by some airlines to supplement the more extensive laboratory procedures. Used oil samples were analyzed with the Fotoscope and compared with their respective spectrometric analysis results to determine if the Fotoscope could be used to supplement the Spectrometric Oil Analysis Program (SOAP). Graphs were plotted and correlation coefficients were calculated to determine relationships between Fotoscope values and wear metal concentrations of oil samples. Additional tests were conducted to determine the effects of various parameters on Fotoscope readings. Fotoscope threshold values

were chosen for each engine based on critical wear metal limits. Although a true relationship between the Fotoscope and spectrometric results was not apparent, threshold depictions revealed that the instrument could be used to supplement SOAP if warranted by further investigation. GRA

N75-30292# Boston Univ., Mass. Dept. of Chemistry.
CATALYTIC ACTIVITY IN THE REVERSION OF AN ENERGY STORING VALENCE PHOTOISOMERIZATION Technical Report, 1 May 1974 - 31 May 1975
Guilford Jones, II and B. R. Ramachandran 1 Apr. 1975 25 p refs
(Contract N00014-67-A-0280-0003; ARPA Order 2721)
(AD-A009123; TR-1) Avail: NTIS CSCL 07/5

Valence photoisomerization of endo-tricyclo(5.2.1.0(2,6))-deca-4,8-diene-3-one gives a cage structure in quantitative chemical yield and with a quantum efficiency of 0.4 (350 nm). The efficiency of storage of electronic excitation energy as chemical potential energy is 8%. The photoisomer is thermally quite stable but can be reverted to dienone in the presence of Rh(I) complexes at 140-180C. Catalyst instability prohibits significant recycling of the system. Rate studies bear significantly on the mechanism of Rh(I) catalyzed valence isomerizations. GRA

N75-30293# Environmental Protection Agency, Athens, Ga. Environmental Research Lab.
INFRARED FOURIER TRANSFORM SPECTROMETRY OF GAS CHROMATOGRAPHY EFFLUENTS Environmental Protection Technology Series
Leo V. Azarraga and Ann C. McCall Jan. 1974 68 p refs
(PB-241304/5; EPA-660/2-73-034) Avail: NTIS; SOD HC CSCL 07D

An evaluation was made of the performance of a computerized Fourier transform infrared spectrometer for the on-line measurement of the infrared spectra of GC effluents. An optimum condition for GCIR analysis was described. Detection limits of a few nanomoles were obtained for common organic compounds. The system requires between 10 and 100 nanomoles of organic substances for qualitative identification. GRA

N75-30361 Technische Hochschule, Aachen (West Germany).
THEORETICAL ANALYSIS OF NONEQUILIBRIUM HYDROGEN AIR REACTIONS BETWEEN TURBULENT SUPERSONIC COAXIAL STREAMS
H. Roertgen *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 10 p refs (For availability see N75-30359 21-31)

N75-30363 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
NUMERICAL ANALYSIS OF THE INFLAMMATION PHASE IN A TURBULENT MIXING BOUNDARY LAYER [ANALYSE NUMERIQUE DE LA PHASE D'INFLAMMATION DANS UNE COUCHE DE MELANGE TURBULENTE]
Otto Leuchter *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 29 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

N75-30364 California Univ., La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
A REVIEW OF SOME THEORETICAL CONSIDERATIONS OF TURBULENT FLAME STRUCTURE
F. A. Williams *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 25 p (For availability see N75-30359 21-31)

N75-30365 Southampton Univ. (England).
KINETIC ENERGY OF TURBULENCE IN FLAMES
K. N. C. Bray *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 20 p refs (For availability see N75-30359 21-31)

N75-30367 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ANALYTICAL METHOD FOR PREDICTING CHEMICAL REACTION RATES IN THE PRESENCE OF INHOMOGENEOUS TURBULENCE (APPLICATION TO TURBULENT COMBUSTION) [METHODE ANALYTIQUE DE PREVISION DES TAUX DE REACTION CHIMIQUE EN PRESENCE D'UNE TURBULENCE NON HOMOGENE (APPLICATION A LA COMBUSTION TURBULENTE)]
Roland Borghi *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 26 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-30294 British Library Lending Div., Boston Spa (England).
SOME FEATURES OF THE INSTABILITY OF NICKEL RICH SUPERALLOYS
X. Wache, Y. Honnorat, and J. Davidson Nov. 1973 30 p refs Transl. into ENGLISH from Mem. Sci. Rev. Met. (France), v. 69, no. 7-8, 1972 p 543-556 In FRENCH and ENGLISH (BLL-BTI-746-01482-(9022.401)) Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons

Nickel-base superalloys are discussed whose electronic structure favors the formation of ordered intermetallic phases of the gamma prime type, Ni3M, with numerous elements and minimized the tendency to precipitate compact embrittling phases, such as Laves' phases and the sigma phase. Carbon in the alloys increases the resistance of the grain boundaries by carbide precipitation, and may be the source of embrittlement phenomena. Instability (relevant to chemical alteration) was investigated which depends on the evolution of phases present when the alloys are first put into use, and is caused by coalescence, decomposition, redissolving, and precipitation. M.J.S.

N75-30295# Laboratorium fuer Betriebsfestigkeit, Darmstadt (West Germany).
FATIGUE INVESTIGATION OF HIGHER STRENGTH STRUCTURAL STEELS IN NOTCHED AND IN WELDED CONDITION. SYNTHESIS OF RESULTS AND TENTATIVE CONCLUSIONS
E. Haibach and R. Olivier 1974 25 p refs Sponsored by CECA
(TB-114(1974)) Avail: NTIS HC $3.25

A research program aimed at normalized steels of type Fe E 355 and Fe E 460 is described. Notched specimens and typical fillet welded joints (nonload-carrying fillets welded in flat and vertical position, and fillet welded cruciform joints) were tested under alternating, zero-tension, and fluctuating tension constant amplitude loading. The investigation was based on statistical test plans, and yielded results of high homogenity and reliability. Author

N75-30296# Royal Aircraft Establishment, Farnborough (England).
THE RESIDUAL STATIC STRENGTH OF FATIGUE CRACKED LUG SPECIMENS OF FOUR ALUMINUM-COPPER ALLOYS
F. E. Kiddle Sep. 1973 42 p refs
(RAE-TR-73084; BR37106) Avail: NTIS HC $3.75

Materials that are crack sensitive were tested and an order of merit of the relative crack sensitivities was established. It is shown that the relationship between residual static strength and crack area is unaffected when the fatigue test was interrupted by a period of ageing or creep but is unaffected by static loading conditions. The reduction in residual static strength during fatigue life was estimated and is shown to depend on the level of alternating stress; at low alternating stress, cracking appears very early in fatigue life with a consequent early fall in strength. Author

N75-30297*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHEMISORPTION KINETICS OF HYDROGEN ON EVAPORATED IRON FILMS

M. R. Shanabarger Jul. 1975 13 p refs Prepared in cooperation with Calif. Univ., Santa Barbara
(Contract NCA2-OR680-501)
(NASA-TM-X-62458; A-6191) Avail: NTIS HC $3.25 CSCL 11F

Measurements were made of the isothermal adsorption-desorption kinetics for H2 chemisorbed onto Fe films. The chemisorption process is observed to proceed via a precursor state of adsorbed molecular hydrogen similar to the H2-Ni system. The first measurements of the activation energy for desorption, and estimates of the values of the fast kinetic rates between the precursor and chemisorbed states are reported. Adsorption into the precursor state does not appear to be activated, but the process connecting the precursor state with the chemisorbed state will, under certain circumstances, be a rate limiting step for adsorption. The effects of contamination of the surface are evidenced in the measurements. Author

N75-30298*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TENSILE PROPERTIES OF PALLADIUM-SILVER ALLOYS WITH ABSORBED HYDROGEN
Robert J. Smith and Dumas A. Otterson Washington Aug. 1975 18 p refs
(NASA-TM-X-3277; E-8161) Avail: NTIS HC $3.25 CSCL 11F

The alloys 90Pd-10Ag, 80Pd-20Ag, 70Pd-30Ag, 60Pd-40Ag, and 50Pd-50Ag containing absorbed hydrogen were tested in tension. The results show the tensile properties to be independent of the phase transition. Also, hydrogen in the lattice does not necessarily cause embrittlement or poor elongation. The changes in the tensile properties appear dependent on the electron to atom site ratio. Author

N75-30299*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CRACK-CLOSURE AND CRACK-GROWTH MEASUREMENTS IN SURFACE-FLAWED TITANIUM ALLOY Ti6Al-4V
Wolf Elber Washington Sep. 1975 17 p refs
(NASA-TN-D-8010; L-10099) Avail: NTIS HC $3.25 CSCL 11F

The crack-closure and crack-growth characteristics of the titanium alloy Ti-6Al-4V were determined experimentally on surface-flawed plate specimens. Under cyclic loading from zero to tension, cracks deeper than 1 mm opened at approximately 50 percent of the maximum load. Cracks shallower than 1 mm opened at higher loads. The correlation between crack-growth rate and the total stress-intensity range showed a lower threshold behavior. This behavior was attributed to the high crack-opening loads at short cracks because the lower threshold was much less evident in correlations between the crack-growth rates and the effective stress-intensity range. Author

N75-30300*# Acurex Corp., Mountain View, Calif. Aerotherm Div.
ANALYTIC AND EXPERIMENTAL EVALUATION OF FLOWING AIR TEST CONDITIONS FOR SELECTED METALLICS IN A SHUTTLE TPS APPLICATION Final Report
John W. Schaefer, Henry Tong, Kimble J. Clark, Kurt E. Suchsland, and Gary J. Neuner Washington NASA Aug. 1975 193 p refs
(Contract NAS1-10913)
(NASA-CR-2531) Avail: NTIS HC $7.00 CSCL 11F

A detailed experimental and analytical evaluation was performed to define the response of TD nickel chromium alloy (20 percent chromium) and coated columbium (R512E on CB-752 and VH-109 on WC129Y) to shuttle orbiter reentry heating. Flight conditions important to the response of these thermal protection system (TPS) materials were calculated, and test conditions appropriate to simulation of these flight conditions in flowing air ground test facilities were defined. The response characteristics of these metallics were then evaluated for the flight and representative ground test conditions by analytical techniques employing appropriate thermochemical and thermal response computer codes and by experimental techniques employing an arc heater flowing air test facility and flat face stagnation point and wedge test models. These results were analyzed to define the ground test requirements to obtain valid TPS response characteristics for application to flight. For both material types in the range of conditions appropriate to the shuttle application, the surface thermochemical response resulted in a small rate of change of mass and a negligible energy contribution. The thermal response in terms of surface temperature was controlled by the net heat flux to the surface; this net flux was influenced significantly by the surface catalycity and surface emissivity. The surface catalycity must be accounted for in defining simulation test conditions so that proper heat flux levels to, and therefore surface temperatures of, the test samples are achieved. Author

N75-30301# Royal Aircraft Establishment, Farnborough (England).
RECRYSTALLISATION OF THE TITANIUM ALLOY Ti-6Al-4V
M. Majdic and G. Ziegler May 1975 13 p refs Transl. into ENGLISH from Z. Metallkde (West Ger.), v. 65, no. 3, 1974 p 173-178
(RAE-Lib-Trans-1823; BR48032) Avail: NTIS HC $3.25

Recrystallization of a commercial Ti-6Al-4V alloy was studied by optical and electron microscopy and by X-ray diffraction. Recrystallization of the alloy structure was induced by heating for various times and temperatures after reductions in the range 10 to 80%. A relationship between grain size, softening, degree of reduction, and annealing temperatures was established. The influence of beta phase on the recrystallization threshold and grain growth is discussed. Author

N75-30302# Council for Scientific and Industrial Research, Pretoria (South Africa).
EFFECT OF THE STRUCTURE AND THICKNESS OF ZINC COATINGS ON THEIR CORROSION IN HOT TAP WATER
H. Leda and Z. Szczepanski 1975 15 p refs Transl. into ENGLISH from Ochr. Koroz. (Warsaw), v. 17, no. 2, 1974, p 37-41
(CSIR-Trans-1214) Avail: NTIS HC $3.25

The influence of the thickness and phase structure of zinc coatings on their corrosion resistance in hot water is examined. Characteristics of the tap water are considered. Results indicate that corrosion and deterioration of pipes is a matter of time regardless of the thickness of the zinc coating. J.M.S.

N75-30303# Army Foreign Science and Technology Center, Charlottesville, Va.
HIGH STRENGTH, HEAT RESISTANT AND STRUCTURAL ALLOYS OF ALUMINUM WITH LITHIUM
M. B. Altman 18 Sep. 1974 40 p refs Transl. into ENGLISH from Alyuminievye Splavy (USSR), no. 7, 1972 p 204-230
(AD-A005977; FSTC-HT-23-0911-74) Avail: NTIS CSCL 11/6

This is chapter 7 of a book entitled Aluminum Alloys. Industrial, Deformable, Sintered and Cast Aluminum Alloys. These alloys are broken down into groups depending on their properties, use and chemical composition. This chapter deals with aluminum alloys alloyed with lithium, with lithium and cadmium, and with lithium and magnesium. Research on proportions, alloying procedures, and the resulting properties of alloys (VAD23 and 01420 alloys in particular) are discussed in detail. Data on mechanical properties at various temperatures and physical and corrosion properties of the alloys are included. GRA

N75-30304# Stanford Research Inst., Menlo Park, Calif.
THERMOCHEMISTRY OF GASEOUS COMPOUNDS OF METALS Annual Summary Report, 18 Jan. - 4 Dec. 1974
D. L. Hildenbrand Jan. 1975 12 p refs
(Contract F44620-73-C-0037; AF Proj. 6813; AF Proj. 9750)
(AD-A005832; AFOSR-75-0266TR) Avail: NTIS CSCL 07/4

The gaseous molybdenum fluorides were studied by high temperature mass spectrometry, using both equilibrium and electron impact techniques. A number of electron impact processes were studied, including positive ion formation by simple and dissociative ionization, and negative ion formation by dissociative electron capture. The results of these studies were used to derive the standard heats of formation, bond dissociation energies and ionization potentials of gaseous MoF, MoF2, MoF3, MoF4, and MoF5. In addition, tentative values for the electron affinities

of MoF4, MoF5, and MoOF3 were derived. The results begin to give some insight into differences in chemical bonding and electronic structure between transition and nontransition metal fluorides. GRA

N75-30305# Ohio State Univ., Columbus.
FORMULATION OF THE LIMITING DUCTILITY IN METAL-WORKING PROCESSES Final Report, Sep. 1973 - Apr. 1974
J. W. Spretnak Aug. 1974 158 p refs
(Contract F33615-72-C-1645; AF Proj. 7351)
(AD-A005917; AFML-TR-74-160) Avail: NTIS CSCL 13/8

The concepts of workability in metalworking processes are examined. The most common limitation is pore formation and coalescence to form internal cracks in the absence of a free surface and cracks at free surfaces. Pore coalescence in technical alloys occurs largely by microinstabilities rather than by reducing the ligament to zero cross-sectional area by plastic flow. The mechanism of ductile fracture is examined, including homogeneous and heterogeneous nucleation, and nucleation by the hydrodynamic separation phenomenon. The effect of a hydrostatic pressure is examined along with factors controlling ductility at elevated temperatures. The two most important variables affecting ductile fracture are the volume fraction of the second-phase particles and the hydrostatic pressure component. GRA

N75-30306# Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy and Materials Science.
HIGH STRENGTH ALUMINUM ALLOYS PREPARED BY IMPROVED SOLIDIFICATION TECHNIQUES Final Technical Report, 1 Nov. 1972 - 31 Oct. 1973
James J. Michalek, Erdman S. Palmer, Rodney G. Riek, Robert Mehrabian, and Merton C. Flemings Jun. 1974 218 p refs
(Contract DAAG25-73-C-0196)
(AD-A006195) Avail: NTIS CSCL 11/4

The work is presented in three parts (I) Preparation and Casting of Metal-Particulate Non-Metal Composites. Up to 30 wt% of particulate ceramic oxides and carbides were dispersed in an Al-5%Si-2%Fe matrix and sand cast into cylindrical slugs. (II) The Effects of Ingot Thermomechanical Processing Treatmemts on Element Homogenization and Recrystallization of 7075-Cr Alloy. (III) Microsegregation in Ternary Peritectic Alloys - A method was devised whereby the peritectic microsegregation in a dilute ternaryeutectic-peritectic alloy may be predicted. Specific predictions are generated for the Al-Mg-Cr and Al-Cu-Cr systems. GRA

N75-30307# Honeywell, Inc., Hopkins, Minn. Government and Aeronautical Products Div.
ADIABATIC SHEAR: AN ANNOTATED BIBLIOGRAPHY
C. R. Hargreaves and L. Werner Jul. 1974 49 p refs
(AD-A006490) Avail: NTIS CSCL 11/6

References relating to the various aspects of Adiabatic Shear have been categorized into the following general areas: ordnance applications, metalworking, metallurgical studies, and miscellaneous aspects. Adiabatic shear has been recognized as a principal failure mechanism in several technology areas peculiar to the ordnance industry. They are the penetration/perforation of armor, the shatter of kinetic energy projectiles, the fragmentation of steel and the explosive forming of slugs. The workability of a material undergoing adiabatic deformation can either be improved due to the formation of a pseudo-superplastic state or degraded due to the localization of strain into narrow bands. Metallurgical studies on metal deformation, ductility, plasticity, and fracture report on the causes and effects of adiabatic shear. GRA

N75-30308# Army Foreign Science and Technology Center, Charlottesville, Va.
RESISTANCE OF HIGH STRENGTH PLATED STEEL TO CORROSION CRACKING
E. A. Savchenkov and A. A. Yavor 14 Jun. 1974 5 p refs Transl. into ENGLISH from Fiz. Khim. Mekhanika Materialov (USSR), Jun. 1972 p 82-83
(AD-A006096; FSTC-HT-23-0417-74) Avail: NTIS CSCL 11/6

An effective method of increasing the operational reliability of high-strength structural steels in aggressive media is cladding them with a thin layer of corrosion-resistant steel or steel alloy. This article discusses the research done on samples of 42Kh-2GSNM steel, test methods and results. A comparison of clad and unclad samples was made. GRA

N75-30309# Naval Research Lab., Washington, D.C.
METHOD FOR RELATING PLASTIC FLOW PROPERTIES TO FATIGUE CRACK PROPAGATION INCLUDING EFFECTS OF STRESS RATIO
J. M. Kraft Jan. 1975 23 p
(RB0230345)
(AD-A006285; NRL-MR-2980) Avail: NTIS CSCL 11/6

Accurate predictive models for fatigue crack propagation, including effects of mean stress, could expedite material characterization tasks of the Navy. To this end, the accuracy of the tensile ligament instability model of fracturing has been improved by considering that the crack-growth-induced strain hardening, which stabilizes creep-induced stress-relaxation, is that of plastic flow only, rather than that of elastic plus plastic strain. R-effect data on Ti-6Al-4V from two literature sources is examined. The growth in vacuum is simply predicted, while that in air must be corrected for its faster growth rate and lower threshold of zero growth. A simple graphical method for matching predicted to actual growth is described. Procedures include SI as well as English units of measurement. GRA

N75-30310# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
EFFECTS OF INTERSTITIAL AND SUBSTITUTIONAL ALLOYING ON DISLOCATION STRUCTURES AND MECHANICAL PROPERTIES OF REFRACTORY METALS Final Scientific Report
T. E. Mitchell and R. Gibala 1975 14 p refs
(Grant AF-AFOSR-2126-71; AF Proj. 9761; AF Proj. 6813)
(AD-A008872; AFOSR-75-3590TR) Avail: NTIS CSCL 11/6

Mechanical testing in tension and compression has been done on single crystals of tantalum and tantalum-base interstitial and substitutional solid solutions involving a wide range of crystallographic orientations. These experiments were complemented by analyses of slip lines and dislocation structures by optical and high voltage electron microscopy, respectively. The research has established many aspects of the relative roles of the Peierls stress of extended screw dislocations and solution hardening in determining the low temperature strength of body-centered cubic materials. The major findings include (a) establishing the importance of the normal stress on low temperature strength of bcc materials; (b) determination of the large effects of solutes on the orientation dependence of yielding, the stress differential in tension and compression, slip and twin systems, and primary screw dislocation structure, distribution, density and cross glide; and (c) determination that the widths of extended screw dislocations in bcc materials are very small. GRA

N75-30311# Naval Ordnance Station, Louisville, Ky.
SPARK SINTERING OF POWDERED METAL Final Report
Jun. 1974 158 p
(AD-A009241; NOSL-MT-021) Avail: NTIS CSCL 13/8

The study was conducted to determine the feasibility of using the spark sintering of powdered metals process for the manufacture of missile and ordnance components. For economical reasons, this investigation was limited to 2 1/2 inch diameter spark sintered cylindrical billets that were 2 1/2 inches, 5 inches, and 7 1/2 inches tall. Billets with theoretical densities of 94% to 99% were obtained from 6Al-4V Titanium, Inconel 718, 410 Stainless Steel, and 4340 alloy steel powders. Test specimens for determining the mechanical properties of each of the subject metals were machined and tested. It was determined that spark sintering simple cylindrical shapes of any of the metals investigated would not be economically feasible at this time. It is the general conclusion that the spark sintering process is economically feasible in special application, where extensive machining labor and/or costly tooling can be eliminated by spark sintering billets close to their final shape. GRA

N75-30341 British Steel Corp., London (England). Research Centre.
STEELS FOR NORTH SEA STRUCTURES

J. A. Chapman, A. Clark, and P. R. Kirkwood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 72-86 (For availability see N75-30334 21-31)
Copyright.

N75-30342 Welding Inst., Cambridge (England).
STEEL CASTINGS FOR STRUCTURAL USE
G. R. Egan and S. J. H. Still (W. Shaw and Co., Ltd.) *In its* Welding in Welding in Offshore Construct., Vols. 1 and 2 1975 p 87-95 refs (For availability see N75-30334 21-31)
Copyright.

N75-30344 Welding Inst., Cambridge (England).
CONTROLLED-ROLLED WELDABLE STRUCTURAL STEELS WITH YIELD STRENGTHS OF 440N/SQUARE mm OR HIGHER AND HAVING A LOW CARBON ACICULAR FERRITE STRUCTURE
W. Fairhurst (Climax Molybdenum Co., Ltd.), H. Imgrund (Climax Molybdenum GmbH, Duesseldorf), and W. E. Lauprecht (Climax Molybdaen Gesellschaft, Zuerich) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 114-122 refs (For availability see N75-30334 21-31)
Copyright.

N75-30349 Welding Inst., Cambridge (England).
HEAT TREATMENT REQUIREMENTS ASSOCIATED WITH NORTH SEA OFFSHORE PRODUCTION PLATFORM
D. J. Cottrell *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 178-186 refs (For availability see N75-30334 21-31)
Copyright.

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-30312 Royal Aircraft Establishment, Farnborough (England).
A CALORIMETRIC STUDY OF THE CURE OF AN EPOXIDE RESIN WITH 2.4 ETHYLMETHYL IMIDAZOLE
J. M. Barton Feb. 1974 21 p refs
(RAE-TR-74004; BR39427) Avail: Issuing Activity

The influence of 2,4-ethyl methylimidazole concentration and cure cycle on the rate of reaction and the glass transition temperature of the cured resin was determined using differential scanning calorimetry. The nature of the overall reaction was found to be complex although the initial stages follow a more simple kinetic pattern. ESRO

N75-30313*# Scientific Translation Service, Santa Barbara, Calif.
TEST METHODS AND RESULTS FOR EIGHT SAMPLES OF ALKALI-FREE STEAM CLEANING AGENTS AND NINE SAMPLES OF ALKALINE LACQUER AND GREASE REMOVING AGENTS
M. J. Reidt Washington NASA Aug. 1975 29 p Transl. into ENGLISH of "De Keuring van 8 Monsters van Alkalivrij Stoomreinigings-Middelen en 9 Monsters van Alkalische Ontlaken Ontvettingsmiddelen en de Aanpassing van de Keuringsmethodiek", Rept. M-67-708 Metaalinstrituut TNO, Delft, Netherlands, 16 Oct. 1967, 26 p
(Contract NASw-2791)
(NASA-TT-F-16504; M-67-708) Avail: NTIS HC $3.75 CSCL 11G

The alkali-free agents used in steam-cleaning machines for the cleaning of ferrous and nonferrous metals and the alkaline agents used in hot water baths to clean steel parts of vehicle undercarriages are examined. Tests were conducted to determine the following qualities in order to update existing Dutch specifications: (1) appearance, particle size, composition, and packaging; (2) cleansing effectiveness or capacity to remove grease or lacquer; (3) corrosive properties and pH values; (4) solubility in distilled and hard water; (5) surface tension and rinse-off with water; and (6) foaming action. Results of the tests and comparative ratings of the products are presented. Author

N75-30314# Army Foreign Science and Technology Center, Charlottesville, Va.
SEVERAL SPECIAL FEATURES OF THE FATIGUE STRENGTH OF GLASS FIBER REINFORCED PLASTICS
B. P. Kishkin 27 Nov. 1974 9 p refs Transl. into ENGLISH from Uprugost i Neuprugost (USSR), no. 2, 1971 p 253-260
(AD-A005983; FSTC-HT-23-0068-75) Avail: NTIS CSCL 11/4

Fatigue tests were conducted on glass fiber reinforced plastics, and the results are discussed and compared with fatigue failure in metals. Topics discussed include fatigue curves, role of initial heating during evaluation of fatigue strength, effect of stress concentration, and the nature of the fatigue failure. M.J.S.

N75-30315# Army Foreign Science and Technology Center, Charlottesville, Va.
REINFORCED PLASTIC STRUCTURES
G. A. VanFofy 30 Sep. 1974 43 p refs Transl. into ENGLISH from Konstruktsii iz Armirovannykh Plastmass (Kiev), 1971 p 7-14, 81-103, 218-220
(AD-A005976; FSTC-HT-23-0900-74) Avail: NTIS CSCL 11/4

These sections of a book discuss the physical and mechanical properties of reinforced plastics and the properties of fillers used. They also cover the properties of complex and combined materials. The properties of materials, including glass fiber, boron, Al2O3, graphite, iron and high-carbon steel wire etc. are presented graphically and mathematically. Stress-strain diagrams are shown for various materials. The properties covered include tensile and shear strength, elasticity, heat conductivity and capacity, dielectric penetrability, creep, etc. GRA

N75-30316# Naval Surface Weapons Center, White Oak, Md.
VISCOELASTIC AND THERMOMECHANICAL BEHAVIOR OF HYSOL 141A RESIN
Joseph M. Augl and James V. Duffy 27 Jan. 1975 24 p
(AD-A006513; NSWC/WOL/TR-75-4) Avail: NTIS CSCL 11/9

Hysol 141A resin (an experimental epoxy resin for filament winding purposes) was investigated for its viscoelastic and thermomechanical behavior. The creep behavior of this resin increases strongly at slightly elevated temperature, which gives rise to some concern if this material were exposed to longterm loading. The resin modulus decreases rapidly above room temperature and the resin is virtually a rubber above 100C, which makes the use of Hysol 141A highly questionable as a winding resin for rocket motor chambers. GRA

N75-30317# Monsanto Research Corp., St. Louis, Mo.
RHEOLOGY OF CONCENTRATED SUSPENSIONS OF FIBERS IN TUBE FLOW. 2: AN EXPLORATORY STUDY
Richard O. Maschmeyer and Christopher T. Hill Oct. 1974 27 p refs
(Contract N00014-67-C-0218; ARPA Order 876)
(AD-A005776; HPC-74-169) Avail: NTIS CSCL 20/4

The viscosities of concentrated suspensions of glass fibers in high viscosity silicone oil were measured with a capillary viscometer using 1/4 inch and 1/8 inch diameter capillaries. Suspension fiber length distributions and rheological properties were highly dependent on mixing technique. The viscosity of the suspensions was strongly dependent on fiber length distribution--a few percent of relatively long fibers in the distribution doubled or tripled the suspension viscosity. Special attention was paid to wall effects which complicate the interpretation of suspension viscosity data. Yield stresses, squeeze-through, the capillary entrance exclusion were observed; their magnitudes increased with fiber length and depended strongly on fiber length distribution. GRA

N75-30318# General Electric Co., Schenectady, N.Y.
INVESTIGATION OF CERAMICS FOR HIGH TEMPERATURE TURBINE VANES Final Report, 23 Jan. - 23 Oct. 1974
Svante Prochazka, Robert A. Giddings, and Curtis A. Johnson 25 Nov. 1974 84 p refs
(Contract N62269-74-C-0255)
(AD-A005830; SRD-74-123) Avail: NTIS CSCL 11/2

The lower limit of boron addition to bring about the highest

degree of densification in submicron SiC containing 0.5% excess carbon is 0.3% B. At this boron level the majority is in solid solution after sintering. Other elements when added in small amounts have little effect, amounts of 1% or more impede densification. The beta to alpha transformation in SiC during sintering is nucleation controlled. Thermal expansion, heat conductivity, elastic moduli, fracture energy, MOR, Weibull modulus and oxidation resistance for sintered SiC are reported. A development of tensile strength measurement technique based on the theta ring test is discussed. A technique for studying the effect of sintering variables such as temperature, time, atmosphere, etc., based on computerized monitoring of shrinkage during sintering, is used for optimization of firing conditions. GRA

N75-30319# Army Foreign Science and Technology Center, Charlottesville, Va.
THE EFFECT OF NAIRIT COATINGS ON CYCLIC STRENGTH OF SAMPLES AND PARTS SUBJECT TO FRETTING CORROSION
V. S. Ivanova and M. G. Veitsman 11 Jul. 1974 10 p refs Transl. into ENGLISH from Ustalost Metal. i Splavov, M. (USSR), 1941 p 103-108
(AD-A006098; FSTC-HT-23-0545-74) Avail: NTIS CSCL 11/3

Coating the mating surfaces of metal parts with Nairit is a new and promising method of preventing fretting corrosion. Nairit is a variety of synthetic rubber which can be applied by simple industrial processes. Comparative tests made on Nairit coatings showed them to be superior to any other protective method used up until now. The article includes results and methods of testing for steel and aluminum parts. By preventing fretting corrosion caused by friction, cyclic strength of components is greatly increased. GRA

N75-30320# Army Foreign Science and Technology Center, Charlottesville, Va.
MANUFACTURE AND USES OF FOAM GLASS
Boris Konstantinovich Demidovich 25 Oct. 1974 353 p refs Transl. into ENGLISH of the book "Proizvodstvo i Primenenie Pendstekla" Minsk, Nauka i Tekhnika, 1972 304 p
(AD-A005819; FSTC-HT-23-746-74) Avail: NTIS CSCL 11/2

The monograph contains information on methods of manufacturing and on the properties of different kinds of foam glass and its applications. Work done in Czechoslovakia, the United States, France, Japan, and other countries is reviewed. Heavy emphasis is placed on the history and present status of foam glass production and uses in the U.S.S.R. A new classification of foam glass based on its properties and fields of application is given. Problems of the kinetics of the formation and buildup of the cellular structure in pyroplastic silicate media are examined. GRA

N75-30321# Dow Chemical Co., Freeport, Tex.
AIR MOBILE UTILITY DISTRIBUTION SYSTEMS Final Report, 20 Apr. 1972 - 29 Apr. 1974
M. A. White, F. W. Spillers, and R. D. Duke Feb. 1975 346 p refs
(Contract F29601-72-C-0088; AF Proj. 683K)
(AD-A008969; AFWL-TR-73-291) Avail: NTIS CSCL 15/5

Phase I involved: (1) a feasibility study of various plastic piping and insulation systems, (2) a state of the art survey to select candidate materials for testing and evaluation, (3) selection and development of a suitable testing program. Phase II consisted of (1) testing of rigid plastic piping (acrylonitrile-butadienestyrene, high density chlorinated polyvinyl chloride, and fiberglass reinforced vinyl ester), (2) testing of urethane foams from various types of field fabrication equipment, (3) a study of the feasibility of using flat hose (firehose) for piping, (4) installed systems cost analyses. Phase III consisted of the reporting of the results of the project. The best rigid plastic piping was found to be polyvinyl chloride for water, waste water, and conduit below 125F; chlorinated polyvinyl chloride for water and waste water above 125F; and glass reinforced pipe for fuel distribution. Flat hose appears feasible for piping, and a polyurethane hose with a Victaulic coupling was recommended. GRA

N75-30322# Michigan Univ., Ann Arbor. Dept. of Materials and Metallurgical Engineering.
REPORT OF THE MATERIALS RESEARCH COUNCIL (1974)
Maurice J. Sinnott Dec. 1974 84 p
(Contract DAHC15-71-C-0253; ARPA Order 2341)
(AD-A008851) Avail: NTIS CSCL 11/2

The report provides a summary of the activities and output of the Materials Research Council for 1974. Personnel, research abstracts, and meeting summaries are included. A broad range of materials research is discussed. GRA

N75-30323# National Bureau of Standards, Washington, D.C. Physical Chemistry Div.
THERMODYNAMICS OF CHEMICAL SPECIES IMPORTANT TO ROCKET TECHNOLOGY Final Report, 1 Jul. 1973 - 30 Jun. 1974
Charles W. Beckett 1 Oct. 1974 202 p refs Sponsored by AFOSR
(AF Proj. 9750)
(AD-A008935; AFOSR-75-0596TR) Avail: NTIS CSCL 07/4

Using a subsecond-duration transient technique, the specific heat, electrical resistivity, and hemispherical total emittance were simultaneously measured over the temperature range 1500-3000 K for some grades of graphite. Similar measurements were made on vanadium, and zirconium in the temperature range of 1500-2100 K. Melting points and radiance temperature (at 650 nm) are reported for zirconium and molybdenum. The temperature of the transition from the alpha-beta phase of zirconium and the energy difference of these phases has also been measured using the subsecond duration transient technique. The products of the reaction of Fe(g) and Ox have been investigated. A preliminary report on the study of the reaction of Ba(g) with vibrationally excited ozone is also presented. The dissociation energies of the scandium group and rare-earth gaseous monoxides are evaluated by reviewing the literature available on Knudsen effusion rates and mass-spectrometric data. A bibliography of the available literature on the spectroscopy of fluorides, oxides, and oxyfluorides belonging to the lanthanide series is given. GRA

N75-30324# DeBell and Richarson, Inc., Enfield, Conn.
MATERIALS BONDING Final Report
Stephen B. King 30 Apr. 1975 47 p
(Contract N00014-72-C-0209)
(AD-A009098; Rept-6041.2) Avail: NTIS CSCL 11/1

A molding compound based on Ethylene Propylene Diene Rubber (EPDM) was developed and tested for use as a tie material in underwater cable and connector splicing. The development of a tie material permits the use of wire and cable with a range of insulating materials in an underwater cable system, and the restoration of insulation at splices and connectors by molding. The report covers the requirements of a tie material and the formulation, and physical and electrical properties of the compound developed. Use of the compound with polyethylene, polypropylene, and neoprene insulations as well as connector materials such as stainless steel, monel, and beryllium copper is discussed. For each of the above materials, methods of surface preparation and/or treatment prior to molding are given. Molding systems and cycle parameters are outlined. GRA

N75-30325# American Cyanamid Co., Stamford, Conn. Chemical Research Div.
EXPLORATORY DEVELOPMENT OF TRANSPARENT CONDUCTOR MATERIALS Final Report
G. Haacke Mar. 1975 65 p refs
(Contract F33615-74-C-5021; AF Proj. 7371)
(AD-A008783; AFML-TR-75-21) Avail: NTIS CSCL 11/3

The development of electrically conductive cadmium stannate coatings with high visible transparency and high infrared reflectivity has been pursued. Efforts concentrated on the investigation of different deposition technologies, film doping, coating of various substrate materials, and film testing. One of the major applications of this research is to develop coatings for solar cells. Chemical spray deposition and vacuum evaporation of cadmium stannate films have been evaluated and compared to radio frequency sputtering. Doping experiments showed that interstitial cadmium and oxygen vacancies are effective dopants for maximum electrical

conductivities. Indium and tantalum doping increase the infrared reflectivity to 90% beyond two micron. Substrate materials investigated included silica, sapphire, soda-lime glass, Chemcor glass, alumina-silica glass, stretched acrylic, and polycarbonate. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N75-30326*# Aerojet Liquid Rocket Co., Sacramento, Calif.
HIGH PERFORMANCE N204/AMINE ELEMENTS: BLOW-APART
B. R. Lawver 15 Nov. 1974 43 p refs
(Contract NAS9-14186)
(NASA-CR-141480; Rept-14186-DRL-3-1) Avail: NTIS HC $3.75 CSCL 21I

The work is reported which was conducted to define the mechanisms governing blowapart of hypergolic propellant through the design, fabrication, test, and analysis of single element injectors. Data were developed that show the parameters exhibiting a controlling influence over blowapart are the chamber pressure, orifice diameter, and propellant temperature. Mixing, popping (cyclic blowapart), low pressure separation, and high pressure separation were identified as modes of reactive impingement. F.O.S.

N75-30327# Georgia Inst. of Tech., Atlanta.
SYNERGESTIC AND NOVEL EFFECTS IN COMPOSITE SOLID PROPELLANT COMBUSTION Annual Summary Report, 1 Sep. 1973 - 31 Aug. 1974
Warren C. Strahle and John C. Handley 1 Oct. 1974 69 p refs
(Contract N00014-67-A-0159-0016; NR Proj. 092-543)
(AD-A006403; ASR-2) Avail: NTIS CSCL 21/9

This report summarizes experiments and analysis concerned with sandwich and cast composite solid propellant combustion. The ingredients used in the experiments are ammonium perchlorate as the oxidizer, hydroxyl terminated polybutadiene as the binder and four catalysts: Harshaw catalyst CU-0202, Fe2O3, ferrocene and iron blue. Cinephotomacrography and the fuze wire technique are used for combustion visualization and burn rate determination. Scanning electron microscopy is used for quenched sample visualization. Areas investigated are (a) analytical and experimental determination of synergistic catalytic effects in sandwich and propellant combustion, (b) the loading of ferrocene into the binder at the molecular level and its effect on sandwich combustion, (c) differential scanning calorimetry of catalyst laden binder and (d) analysis of sandwich deflagration. GRA

N75-30328# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
THE EFFECTS OF APPROVED CORROSION INHIBITORS ON THE PERFORMANCE OF MILITARY STANDARD FILLER/SEPARATORS
Shirley B. Boulware Nov. 1974 29 p
(DA Proj. 1G7-62708-D-506)
(AD-A006492; USAMERDC-2117) Avail: NTIS CSCL 21/4

This final report covers an investigation of 12 corrosion inhibitors specified in Specification MIL-I-25017, Inhibitors, Corrosion, Fuel Soluble, in combination with the anti-icing additive (AIA) specified in Specification MIL-I-27686, (Inhibitor, Fuel System, Icing). These inhibitors are used in JP-5 fuel in accordance with Specification MIL-F-8901, Filter/Separators, Liquid Fuel and Filter/Coalescer Elements, Fluid Pressure Inspection Requirements and Test Procedures For. Performance data is gathered in order to determine if a military standard filter/coalescer element is capable of decontaminating inhibited JP-5 fuel as it is continuously injected with water and with water/solids combinations. GRA

N75-30329# Army Foreign Science and Technology Center, Charlottesville, Va.
CORROSION INHIBITING ADDITIVES FOR SULFUR CONTAINING FUELS
Yu. Shekhter, N. I. Evstratova, and V. N. Cherepenina 28 May 1974 12 p refs Transl. into ENGLISH from Khim i Tekhnol. Topliv i Masel (USSR), no. 12, 1964 p 47-51
(AD-A006089; FSTC-HT-23-391-74) Avail: NTIS CSCL 21/4

Performance of numerous corrosion inhibitors was reported and discussed. Various amine corrosion inhibitors were synthesized and tested, and they proved to be less effective than sulfonates or nitrated products. Various ammonium salts of acid, oil-soluble products were synthesized and tested by the authors, some of them proving to be quite effective. Various combined additives, produced by mixing acid sulfo and nitro products, turn out to be the most effective corrosion inhibitors and are widely used at present. GRA

N75-30330# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
DEVELOPMENT OF AN IMPROVED FUEL FILTRATION-TIME TEST Technical Report, Feb. 1972 - Jun. 1973
Paul E. Hayes, Jr. Sep. 1974 51 p
(AF Proj. 3048)
(AD-A008772; AFAPL-TR-74-33) Avail: NTIS CSCL 21/4

Field studies indicate a correlation between the premature plugging of filter-separator elements and the filtration time of the suspect fuel. This report discusses improvements in the filtration-time test and the significance of test variables. The possible combining of the fuel filtration-time test with the ASTM D-2276 Particulate Contaminant Test is also investigated. GRA

N75-30331# GCA Corp., Bedford, Mass. Technology Div.
WASTE AUTOMOTIVE LUBRICATING OIL REUSE AS A FUEL Socioeconomic Environmental Studies Series.
Steven Chansky, James Carroll, Benjamin Kincannon, James Sahagian, and Norman Surprenant Sep. 1974 218 p
(Contract EPA-68-01-1859)
(PB-241357/3; EPA-600/5-74-032) Avail: NTIS; SOD HC CSCL 21D

This study evaluates the technical, economic, and environmental feasibility of automotive waste oil reuse as a fuel. The supply and potential marketability of waste oil fuel is considered in relationship to existing and projected fossil fuel usage in the United States. Its use will alleviate a serious waste oil disposal problem. The physical and chemical properties of waste oil are presented and serve as the basis for subsequent assessment of waste oil usage options: the use of untreated waste oil as a blended fuel oil or as a supplement to coal combustion and the use of waste oil following treatment to alleviate technical and environmental impacts. Various treatment methods are discussed and their cost and effectiveness assessed. The reduction of environmental impacts by the use of particulate emission control system and industrial utilization of fuel and control equipment are discussed. GRA

N75-30332# Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
STATE-OF-THE-ART FOR THE INORGANIC CHEMICALS INDUSTRY: COMMERCIAL EXPLOSIVES Environmental Protection Technology Series
James W. Patterson Mar. 1975 89 p refs
(Grant EPA-R-800857)
(PB-240960/5; EPA-600/2-74-009B) Avail: NTIS HC $4.75; HC also available $11.00/set of 3 reports as PB-240958-SET CSCL 07A

A literature and field study of the commercial explosives industry reveals that on the basis of products manufactured, plant size, and the nature of the wastewater, the industry may be divided into three segments. One, complex facilities, are large plants manufacturing a variety of explosives and intermediate products. The second category is small specialized formulation plants, typically limited to blending explosives formulations for use in nearby mining activities. The final category is specialty product facilities, devoted to manufacture of select ingredients such as lead azide and other explosives initiators, blasting caps, electric matches and similar appurtenance items. GRA

N75-30333# Research Triangle Inst., Durham, N.C.
GUIDELINES FOR DEVELOPMENT OF A QUALITY ASSUR-

ANCE PROGRAM. VOLUME 13: TEST FOR LEAD GASOLINE BY ATOMIC ABSORPTION SPECTROMETRY
Nov. 1974 57 p refs
(Contract EPA-68-02-1234)
(PB-241264/1; EPA-650/4-74-005m) Avail: NTIS HC $4.25 CSCL 14B

Guidelines are presented for a quality control program for the determination of the total lead content of gasoline within the concentration range of 0.010 to 0.10 g of lead/U.S. gals. These guidelines include: (1) good operating practices, (2) directions on how assess performance and quality data, (3) directions on how to identify trouble and improve data quality, (4) directions to permit design of auditing activities. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-30334 Welding Inst., Cambridge (England).
WELDING IN OFFSHORE CONSTRUCTIONS. VOLUME 1: THE PAPERS. VOLUME 2: DISCUSSIONS
1974 303 p refs Intern. Conf. held at Newcastle-upon-Tyne, Engl., 26-28 Feb. 1974 2 Vol.
Copyright. Avail: Issuing Activity

Materials selection and production engineering methods are detailed for obtaining fracture resistant welds in offshore structures. For individual titles, see N75-30335 through N75-30358.

N75-30335 Welding Inst., Cambridge (England).
MATERIAL AND STRUCTURAL PROBLEMS IN OFFSHORE INSTALLATIONS **c37**
J. G. Hicks *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 1-9 refs (For availability see N75-30334 21-31)
Copyright.

Available information is reviewed that relates to the fracture of welded steel structures to enhance the structural safety of offshore structures. The proposed research requirements can be summarized under the following headings: (1) fatigue data for welded joints in tubular structures in marine conditions and fatigue life prediction methods; (2) weld metal fracture toughness requirements, criteria, and achievements; (3) quantitative criteria and relevant testing techniques to define the risk of lamellar tearing in structural steels; (4) techniques which will minimize the risk of solidification cracking in weld metal; (5) cooling rates in weld metals in connection with the risk of hydrogen cracking; (6) the effect of cathodic protection on the occurrence of stress-corrosion cracking; and (7) development of underwater welding processes, procedures, and consumables. Author

N75-30336 Shell Oil Co., New Orleans, La.
GENERAL CONSIDERATIONS FOR TUBULAR JOINT DESIGN **c37**
P. W. Marshall *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 10-34 refs (For availability see N75-30334 21-31)
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Background data for tubular joint design rules in American codes (API RP 2A and AWS D1.1-72) are reviewed in terms of static ultimate strength and fatigue. The problem of extension to high cycle fatigue, which becomes increasingly important in severe weather areas and/or deep water, is explored. Case histories of offshore failures and noteworthy non-failures are examined in the light of proposed criteria and sensitivity/risk analysis. Author

N75-30337 Welding Inst., Cambridge (England).
FATIGUE DATA INTERPRETATION AND THE RELEVANCE OF CORROSION EFFECTS **c37**
B. Tomkins (United Kingdom Atomic Energy Authority) *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 35-45 refs (For availability see N75-30334 21-31)
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Materials fatigue data are collected mainly from two types of test: the endurance test and the crack propagation test. Data of both types are considered along with new crack propagation data for microflawed specimens of three steels. It is found to be still true that fatigue failure is dominated in all applied stress range conditions by crack propagation. However, in considering environmental effects, the ability of a hostile environment to produce surface flaws introduces a strong dependence of fatigue endurance on a crack initiation time. Author

N75-30338 Osaka Univ. (Japan). Dept. of Welding Engineering.
CORROSION FATIGUE PROPERTIES OF STRUCTURAL STEEL AND ITS WELDED JOINTS IN SEA WATER-PROPERTIES UNDER HIGH AMPLITUDE AND SLOW RATE OF CYCLIC STRESSING **c37**
M. Watanabe and Y. Mukai *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 46-53 refs (For availability see N75-30334 21-31)
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Corrosion fatigue is one of the most important problems in the design and fabrication of offshore constructions which are usually subjected to cyclic stress as a result of wind and rough seas. Particularly at the welds and complex structural details, cyclic stress may locally exceed the elastic limit of the material because of the stress concentration and the superposition of welding residual stresses. The corrosion fatigue properties of constructional steel in sea water under high stress are studied for the design and fabrication of offshore construction. In changing the cyclic rate of stressing, it is shown that the number of cycles to failure decreases with a lowering of cyclic rate of stressing from 1000 to 0.1 cycles/min. This means that a large swell off shore will be more dangerous for corrosion fatigue strength than the small pitch wave near the shore. Temperature and dissolved oxygen (including the wet-dry alternation of sea water) are generally considered the main factors of the ocean environment. Author

N75-30339 Shell Exploration and Production Lab., Rijswijk (Netherlands).
STRESS ANALYSIS OF A TURBULAR CROSS-JOINT WITHOUT INTERNAL STIFFENING FOR OFFSHORE STRUCTURES **c39**
F. I. A. Brink and A. H. VanderKrogt *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 54-61 refs (For availability see N75-30334 21-31)
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Intersections of tubulars of equal diameter are frequently encountered in fixed as well as in floating drilling and production platforms. The local stresses and consequently the fatigue resistance of such structures are largely governed by the size and the quality of the welds. A numerical and experimental investigation has been carried out to study the local stress pattern in a cross joint with specific weld sizes. The numerical results have been found to compare quite well with the results of a large scale model test. After the static tests the cross joint has also been subjected to a constant amplitude tension/compression load in the brace. The joint failed as a result of a crack in the longitudinal seam weld of the can member where the highest stress occurred. Author

N75-30340 Lloyds Register of Shipping, London (England).
DESIGN APPRAISAL OF OFFSHORE PLATFORMS OF WELDED TUBULAR CONSTRUCTION **c39**
C. A. Bainbridge and G. P. Smedley *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 62-71 refs (For availability see N75-30334 21-31)
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The various stages in the appraisal of the design of an offshore tubular steel platform have been outlined and consideration has been given to the problems of fatigue analysis. It is in this area that research is required for the evaluation of peak strains at tubular connections and the improvement of the reliability of the allowable endurance curves. Author

N75-30341 British Steel Corp., London (England). Research Centre.
STEELS FOR NORTH SEA STRUCTURES **c26**
J. A. Chapman, A. Clark, and P. R. Kirkwood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 72-86

(For availability see N75-30334 21-31)
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The exploitation of North Sea oil and gas natural resources has led to an ever increasing demand for drilling rigs, permanent wellhead platforms, and pipelines to transport the products to storage areas and refineries. The requirements of the various tubular elements associated with platforms depend on their location within the overall structure, but it is essential that the material specified is capable of meeting the requirements after the most onerous mechanical and thermal treatments likely to be applied during forming. Particular attention is given to supply of node plate material for which some minimum level of through thickness ductility is essential and results are presented to demonstrate the performance of steel currently being supplied. Recent trends towards larger diameter pipes of wall thicknesses up to 19mm have demanded increased yield stress at fairly low carbon equivalent (CE) levels. Author

N75-30342 Welding Inst., Cambridge (England).
STEEL CASTINGS FOR STRUCTURAL USE c26
G. R. Egan and S. J. H. Still (W. Shaw and Co., Ltd.) *In its* Welding in Welding in Offshore Construct., Vols. 1 and 2 1975 p 87-95 refs (For availability see N75-30334 21-31)
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Detailed arguments for the use of welded steel castings for structures in the North Sea and the advantages of using castings in a composite (cast/welded/wrought) structure are discussed. Designs are presented for such steel castings; information on strength and fracture toughness indicates that suitable steel casting materials are available. The fracture toughness data are also used to indicate quality levels required for operation in the North Sea and these are compared with current standard requirements. Author

N75-30343 Welding Inst., Cambridge (England). Metallurgical Dept.
THE USE OF SMALL-SCALE DESTRUCTIVE TESTS TO ASSESS SUSCEPTIBILITY TO LAMELLAR TEARING c38
J. C. M. Farrar, B. J. Ginn, and R. E. Dolby *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 96-113 refs (For availability see N75-30334 21-31)
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Most welded offshore fabrications provide conditions for the occurrence of lamellar tearing. This has led to the need for tests to assess short transverse (ST) ductility, and to the specification of steels with minimum ST ductilities for certain critical applications. In the absence of suitable nondestructive testing techniques considerable reliance has been placed upon the use of small scale destructive tests. The background and development of two small scale mechanical tests are described - the ST tensile test and the slice bend test - which go some way to meeting present requirements. Author

N75-30344 Welding Inst., Cambridge (England).
CONTROLLED-ROLLED WELDABLE STRUCTURAL STEELS WITH YIELD STRENGTHS OF 440N/SQUARE mm OR HIGHER AND HAVING A LOW CARBON ACICULAR FERRITE STRUCTURE c26
W. Fairhurst (Climax Molybdenum Co., Ltd.), H. Imgrund (Climax Molybdenum GmbH, Duesseldorf), and W. E. Lauprecht (Climax Molybdaen Gesellschaft, Zuerich) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 114-122 refs (For availability see N75-30334 21-31)
Copyright.

The development of a family of low alloy high yield strength steels is described. Typical of this class are steels containing 0.02-0.06%C, 1.3-2.2%Mn, 0.2-0.4%Mo, and 0.05-0.09%Nb. The combination of yield strength and impact properties is dependent on the specific composition and processing conditions, the effects of which are described. As an example, statistical analysis of data from a commercial production of 1.06m diameter welded pipe gave a mean yield strength of 517N/sq mm with a two thirds scale Charpy impact energy of 155J/sq cm at -4 C and a 50% shear FATT of -43 C. Author

N75-30345 Welding Inst., Cambridge (England).
MANUAL AND AUTOMATIC WELDING CONSUMABLES FOR USE ON OFFSHORE CONSTRUCTIONS c37
H. C. Buckingham (BOC-MUREX Welding Res. and Develop. Labs.), P. R. Kemp (BOC-MUREX Welding Res. and Develop. Labs.), and M. Penson (BOC-MUREX Welding Res. and Develop. Labs.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 123-137 refs (For availability see N75-30334 21-31)
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In view of the exacting environment of the North Sea, it is considered necessary to take the most stringent precautions in the fabrication of offshore steel structures to minimize the risk of failure. To establish which consumables would meet the process and metallurgical requirements an extensive test program was drawn up to assess their suitability. For manual metal arc electrodes the tests were made in all welding positions using weld preparations and procedures similar to those proposed on site. With automatic consumables flux and wire combinations were chosen giving a range of welding characteristics and metallurgical quality. In addition to conventional mechanical testing, crack opening displacement (COD) data were obtained to give further indications of the resistance of the joints to brittle fracture. Author

N75-30346 Welding Industries, Zurich (Switzerland).
FACTORS AFFECTING THE PROPERTIES OF SUBMERGED-ARC WELD METAL IN 60mm THICK BS 4360: 1968, GRADES 50D AND 55E STEEL c37
H. D. Baach and P. Colvin (Oerlikon Electrodes, Ltd., Engl.) *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 138-146 (For availability see N75-30334 21-31)
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The tubular supporting legs for North Sea offshore production platforms are prefabricated prior to site assembly, using mainly the submerged arc process for both the longitudinal and circumferential seams. Such tubulars contain sections with different diameters and wall thickness which make it difficult to standardize on an exact edge preparation. Variations in properties of submerged arc weld metal are considered that can occur when welding 60mm thick Grade 50D material which contains Nb, with different edge preparations and welding wires, but making all the other possible welding procedure variables standardized. The broad conclusions reached is that careful consideration must be given to edge preparation design and filler wire analysis when welding 60mm thick BS 4360, Grade 50D. Such consideration is necessary to achieve consistently the desired combination of strength and fracture toughness properties, by either reducing or controlling weld metal Nb to a noncritical level. Author

N75-30347 Whessoe Ltd., Darlington (England).
CONTROLLING WELD METAL TOUGHNESS IN MANUAL METAL-ARC WELDS c37
S. Nicholson and P. F. Rogers *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 147-166 refs (For availability see N75-30334 21-31)
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Data are presented for the effect of heat input on notch toughness of weld metal, in vertical-up C-Mn steel weldments deposited by using manual metal arc electrodes. The electrodes studied had nickel contents varying from a residual element level to approximately 3.5%. Attention was focused on the effects of relatively high heat input levels in the range of 2.5 to 14.5kJ/mm. Toughness data, Charpy V and COD are considered in relation to both microstructure and composition and are compared with similar data for production welds. The relative insensitivity of high nickel weld metals to variations in heat input was confirmed and the effect of intermediate nickel contents evaluated. The results indicate that Charpy V test data reflect full thickness COD behavior sufficiently well to be used for quality control purposes. Author

N75-30348 British Steel Corp., London (England). Welding Group.
DEVELOPMENT OF AUTOMATIC WELDING PROCEDURES TO MEET TOUGHNESS REQUIREMENTS FOR OFFSHORE STRUCTURES c37
A. Clark, M. J. George, and P. R. Kirkwood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 167-177 refs (For availability see N75-30334 21-31)
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Work leading to formally agreed welding procedures for

submerged arc seam welds in tubular members for offshore platforms, is discussed in terms of full thickness COD tests carried out at 38 mm in the as-welded condition, and at 38 and 63 mm in the stress relieved condition. It was found that the stringent requirements with respect to impact toughness can be achieved with a comfortable margin by the selection of suitable consumables, over a range of heat inputs and interpass temperatures. Defect tolerances, computed on the basis of COD tests, suggest that good NDT practice will ensure that no defects greater than tolerable size are left in the structure, in the as-welded condition. After stress relief, large through thickness defects were shown to be tolerable. Author

N75-30349 Welding Inst., Cambridge (England).
HEAT TREATMENT REQUIREMENTS ASSOCIATED WITH NORTH SEA OFFSHORE PRODUCTION PLATFORM **c26**
D. J. Cottrell *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 178-186 refs (For availability see N75-30334 21-31)
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The combined aspects of low temperature service and severe marine conditions have given rise to the use of high yield notch ductile steels, and plate thicknesses well in excess of 50mm for many parts of oil production platform structures. The size and thicknesses involved have resulted in special problems in preheat and postweld heat treatment. The criteria regarding the heat treatment specifications are presented. The preheat requirement, and production commitments have led to the development of electrical resistance equipment capable of easy application and fast rise to temperature. Postweld heat treatment requirements are particularly marked at the node sections of production platforms. In view of the size of these members, large furnaces of the order of 10 x 10 x 20m have been constructed at the various fabrication yards, with special emphasis on the extreme weather conditions and desirable condition of temperature uniformity. The high velocity gas technique is described, and also typical field results demonstrated. Author

N75-30350 Welding Inst., Cambridge (England).
THE ROLE OF NON-DESTRUCTIVE TESTING IN THE OFFSHORE OIL AND GAS INDUSTRY **c38**
V. A. Peters (Unit Inspection Co.), D. M. Davies (Unit Inspection Co.), and B. G. Hughes (Unit Inspection Co.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 187-194 (For availability see N75-30334 21-31)
Copyright.

Nondestructive testing of welds in platform structures during construction and in service (involving the application of test methods below the water surface) is discussed, and a description of the application of ultrasonics to the rapid examination of circumferential butt welds in undersea oil lines during lay barge operation is given. Author

N75-30351 International Combustion Ltd., London (England).
THE FABRICATION OF DECK NODES FOR NORTH SEA OIL DRILLING RIGS **c37**
O. K. Gorton, A. E. Allsop, and K. H. Wood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1975 p 195-204 (For availability see N75-30334 21-31)
Copyright.

The fabrication of deck nodes for North Sea oil drilling rigs has been carried out over the past two years. The purely practical aspect of the fabrication of these nodes is discussed with particular reference to specific areas where relatively tight tolerances need to be met, along with the production engineering techniques to overcome such tolerances. Special reference is made to the geometry of these components along with the practical and technical problems such geometries have on the welding, building, and determination of defects from an inspection aspect. Author

N75-30352 Welding Inst., Cambridge (England).
SOME ASPECTS OF THE WELDING QUALITY CONTROL IN TWO NORTH SEA OFFSHORE DRILLING PLATFORMS **c38**
G. A. Alpsten (Industrikontrol AB, Enskede, Sweden) and B. I. B. Hallberg (Industrikontroll AB, Enskede, Sweden) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 205-213 (For availability see N75-30334 21-31)
Copyright.

Some points experienced from the nondestructive testing of the structures of two North Sea offshore drilling platforms are reported. For each platform some 6000m of weld were examined by ultrasonic testing and some 8000 X-ray films were obtained, together representing roughly 60% of the actual welding costs. Of the total examined weld length, less than 6% was repaired as a result of the quality control efforts. The rigorous material quality requirements and the advanced structural system posed several new questions to the testing methods. Questions which have been considered of utmost importance are the effects of lamellar tearing type defects, misalignments of insert plates and backup plates in tube crossings, and misfit after joining large prefabricated elements which would result in large reaction type residual stresses. Author

N75-30353 Welding Inst., Cambridge (England).
THE APPLICATION OF MULTIOPERATOR REMOTE CONTROL WELDING EQUIPMENT **c37**
J. P. Bevan *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 214-216 (For availability see N75-30334 21-31)
Copyright. Avail: NTIS

In order to appreciate the fundamental problems of selection of welding equipment for the fabrication of oil rigs and ancillary equipment, it is necessary to take a brief look at the traditional British shipbuilding industry and analyze some of the inherited problems of applying multi-operator manual arc equipment. Thereafter the most modern available replacements are considered as well as the benefits offered and how this equipment meets the demands of the relatively new oil rig and offshore equipment manufacturing industry. The main objective, perhaps, is to influence against investment in manufactured arc welding equipment which could be considered obsolescent. Author

N75-30354 E.O. Paton Electric Welding Inst., Kiev (USSR).
UNDERWATER WELDING OF METALS **c37**
I. M. Savitch *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1975 p 217-220 (For availability see N75-30334 21-31)
Copyright.

A new mechanized underwater welding process by a wet method has been developed. Electrode wires and equipment for mild and low alloy steel welding in fresh and sea water have been created. The mechanical properties of the welded joint are at the level of those of the basic metal and meet the high requirements of existing standards. Butt, fillet, and lap joints can be carried out on workpieces with walls 3mm thick and more in any position. Author

N75-30355 Welding Inst., Cambridge (England).
A STANDARD FOR EXPLOSIVELY WELDING PIPELINES **c38**
B. Phelps (British Gas Corp.) and N. H. Evans (British Gas Corp.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 221-227 refs (For availability see N75-30334 21-31)
Copyright.

Solid phase interfacial weld characteristics require a standard for explosively welded pipelines whose acceptance requirements are based upon systematic testing of various joint configurations in various pipe sizes. From results which have been obtained to date it seems that fatigue testing either by internal pressure cycling or by alternating bending, or both, provide the most searching tests of the new welding procedure. Author

N75-30356 Welding Inst., Cambridge (England).
EXPLOSIVE WELDING IN PIPELINE OPERATIONS. PART 1: APPLICATION OF EXPLOSIVE IN OFFSHORE OPERATIONS **c37**
T. J. Corbishley *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 228-238 refs (For availability see N75-30334 21-31)
Copyright.

The use of explosive welding in pipelining operations and other offshore activities is seen to offer considerable advantages, particularly to subsea applications. The case for explosive welding is discussed and a few applications are outlined. Author

N75-30357 Welding Inst., Cambridge (England).
CHOOSING CONSUMABLES AND WELDING PROCEDURES TO ENSURE STRONG, TOUGH WELDED STRUCTURES **c37**
W. H. Winn (Naval Construction Res. Establ.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 243-249 (For availability see N75-30334 21-31)
Copyright.

The service loading which a welded steel offshore structure must withstand consists of a combination of static, dynamic and cyclic loads. The distribution of load carrying material, the plate thicknesses and the specified parent plate tensile properties are obtained by consideration of this static load pattern. A crack starter bulge explosion test is used as a type test to simulate impulsive dynamic service loading at low temperatures which might be experienced by some parts of offshore structures. Results show that a weldment must meet the following requirements: (1) all regions of the weldment must be sufficiently free of cracks; (2) the weld metal must slightly overmatch the parent plate in yield strength and withstand about 5% strain; and (3) the weldment must have adequate fracture toughness to arrest a running crack when deformed plastically at test temperature. Author

N75-30358 Welding Inst., Cambridge (England).
WELDING IN OFFSHORE CONSTRUCTIONS. VOLUME 2: DISCUSSIONS
In its Welding in Offshore Construct., Vols. 1 and 2 1974 p 251-299 (For availability see N75-30334 21-31)
Copyright.

Structural engineering aspects and welding materials in the form of steels and consumables advocated in the production of large offshore structures and pipelines are considered. G.G.

N75-30359# Advisory Group for Aerospace Research and Development, Paris (France).
ANALYTICAL AND NUMERICAL METHODS FOR INVESTIGATION OF FLOW FIELD WITH CHEMICAL REACTIONS, ESPECIALLY RELATED TO COMBUSTION
May 1975 324 p refs In ENGLISH and FRENCH Conf. held at Liege, 1-2 Apr. 1974
(AGARD-CP-164) Avail: NTIS HC $9.25

Various methods used to study flows with chemical reactions and combustion are discussed. Major topic areas covered include: classical integration methods used to solve problems of laminar in turbulent (mean flow) combustion; calculation methods used to study turbulent flames; and methods applicable to combustors and their operation and to the analysis of pollutant formation. For individual titles, see N75-30360 through N75-30375.

N75-30360 Imperial Coll. of Science and Technology, London (England).
NUMERICAL COMPUTATION OF PRACTICAL COMBUSTION CHAMBER FLOWS **c34**
D. B. Spalding *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 24 p refs (For availability see N75-30359 21-31)

Numerical procedures for predicting combustion-chamber flows include mathematical models of physical processes, and computer programs for solving the resulting differential equations. The mathematical models for turbulence, radiation, chemical kinetics, and two-phase effects are briefly reviewed along with the fields of applicability of the computer programs PASS, EASI, STABL and TRIC, all of which employ the SIMPLE algorithm. The ways in which the computer programs and the mathematical models can be used for practical purposes are illustrated by: steady flame spread in a duct; the axisymmetrical combustor; unsteady flame spread in a duct; the inclined rocket exhaust; the annular-combustor sector; and the reaction region of a chemical laser. It is argued that the main current needs are for testing and exploitation of the numerical prediction procedures which recent research has made available. Author

N75-30361 Technische Hochschule, Aachen (West Germany).
THEORETICAL ANALYSIS OF NONEQUILIBRIUM HYDROGEN AIR REACTIONS BETWEEN TURBULENT SUPERSONIC COAXIAL STREAMS **c25**
H. Roertgen *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 10 p refs (For availability see N75-30359 21-31)

An analytical study is made of the free turbulent mixing and combustion taking place in the mixing layer between a cold supersonic central hydrogen jet and a preheated supersonic coaxial air stream. Finite difference approximations are developed that uncouple the governing equations by local linearization techniques together with iterative methods. Eddy viscosity models are used to describe the turbulent transport processes. Models are investigated for the prediction of the combustion process: (1) local chemical equilibrium and (2) steady state kinetics. Experimental investigations of the studied hydrogen-air flame are carried out. The numerical predictions are compared with the experimental results. Author

N75-30362 Societe Generale de Constructions Electriques et Mecaniques Alsthom, Grenoble (France).
THE SIMULATION OF TURBULENCE IN IRREPRESSIBLE MODELS [LA SIMULATION DE LA TURBULENCE DANS LES MODELES PETULA] **c34**
J. P. Huffenus *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 14 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

Mathematical models of turbulent flow are examined. It is shown that partial differential equations are not sufficient to solve the problem of determining turbulent flow characteristics in two parameter models. A model based on these findings is proposed for constant density flows and for flows with density differences, in which the force of gravity can modify the turbulence. Author

N75-30363 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
NUMERICAL ANALYSIS OF THE INFLAMMATION PHASE IN A TURBULENT MIXING BOUNDARY LAYER [ANALYSE NUMERIQUE DE LA PHASE D'INFLAMMATION DANS UNE COUCHE DE MELANGE TURBULENTE] **c25**
Otto Leuchter *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 29 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

A numerical description is given of the inflammation process in the turbulent mixing region between a fuel jet (mixture of H2 and AR) and an external air stream, the two fluids being at the same temperature and of the same density. The initial conditions at the confluence are characterized by the velocity ratio and the initial boundary layer thicknesses. The description of the fields of mean quantities and second order correlations is performed by means of balance equations constructed from the general conservation theorems. Simplifying assumptions are introduced for the chemical kinetics, accounting for the particular behaviour of the hydrogen-oxygen chain reaction in the region of short ignition delay. The number of equations describing the chemical production and the effects of turbulence on it may thus be considerably reduced. The numerical solutions have revealed that the slowing effects of the turbulence are little affected by the initial conditions but depend essentially on the behaviour of the kinetics in the mixing layer, whenever the reduction of the inflammation length in the presence of boundary layers is due mainly to the distorsion of the mean velocity field. A simple criterion for the inflammability of jets is established taking into account these results. Author

N75-30364 California Univ., La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
A REVIEW OF SOME THEORETICAL CONSIDERATIONS OF TURBULENT FLAME STRUCTURE **c25**
F. A. Williams *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 25 p (For availability see N75-30359 21-31)

The structure and motion of a laminar flame in a shear flow is considered. The strain rate is established as a key turbulent-flow factor influencing flame structure. It is concluded that premixed turbulent flames seldom are composed of an ensemble of sheared, premixed, laminar flames, while turbulent

diffusion flames often are composed of a collection of laminar diffusion flames. A statistical description of premixed turbulent flame structure is outlined for turbulence of low intensity. The use of coupling functions is discussed for describing the structure of turbulent diffusion flames that consist of a statistical collection of laminar diffusion flames for which the flame-sheet approximation is applicable. It is shown how to obtain in a simple manner the average local volumetric production rate of nitric oxide in the turbulent diffusion flame, requiring as input only the local probability density function for the inert, evaluated at an inert concentration which corresponds to the flame-sheet position. Author

N75-30365 Southampton Univ. (England).
KINETIC ENERGY OF TURBULENCE IN FLAMES c25
K. N. C. Bray *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 20 p refs (For availability see N75-30359 21-31)

The exact equations of turbulent, reacting flow are used, together with an order of magnitude analysis, to derive an approximate form of the turbulence kinetic energy balance equation for premixed, two-dimensional, turbulent flames at low Mach number and high Reynolds number. Plausible closure hypotheses are then introduced, in order to obtain an equation which reduces to a familiar form of the turbulence kinetic energy equation, in the case of nonreacting flow of constant density. Additional terms, related to heat release and mass transport, become important in turbulent flames. Experimentally observed effects of turbulence on a variety of turbulent flame configurations are discussed in terms of this equation. Author

N75-30366 Aerospace Research Labs., Wright-Patterson AFB, Ohio.
A NUMERICAL SPECTROSCOPIC TECHNIQUE FOR ANALYZING COMBUSTOR FLOWFIELDS c34
Michael E. Neer *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 22 p refs (For availability see N75-30359 21-31)

A computer program which calculates the ultraviolet emission and absorption spectra of OH is presented for use in conjunction with numerical programs which predict combustor flow field properties. Spatial distributions of OH number density and temperature, resulting from analytical flow field calculations, are used as input data for calculating the absolute intensities of the spectra. Of particular interest is the ability to calculate the shapes of the intensity envelopes associated with the low resolution slit settings of a given spectrometer. Comparisons are made with actual spectral data obtained with various degrees of spectral resolution. The computer program is also used to generate graphical inversion techniques for analyzing experimental spectra. An example is given in which one such graphical technique is used to obtain average temperatures and number densities along the axis of an axisymmetric duct containing a supersonic diffusion flame. Another example is presented to demonstrate the manner in which a second inversion technique can be used to obtain radial profiles of temperature and OH number density from radial scanning of an axisymmetric combustor flow field. Two cases involving thermodynamic nonequilibrium are also discussed, one of which involves a hot vibrational band and the other an electronic nonequilibrium. Author

N75-30367 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ANALYTICAL METHOD FOR PREDICTING CHEMICAL REACTION RATES IN THE PRESENCE OF INHOMOGENEOUS TURBULENCE (APPLICATION TO TURBULENT COMBUSTION) [METHODE ANALYTIQUE DE PREVISION DES TAUX DE REACTION CHIMIQUE EN PRESENCE D'UNE TURBULENCE NON HOMOGENE (APPLICATION A LA COMBUSTION TURBULENTE)] c25
Roland Borghi *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 26 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

A theoretical approach to the reciprocal influence between turbulence and chemical reactions is presented. The approach is based on a conventional method for studying turbulence in inhomogeneous, nonreactive flows, where the fluctuation evolution is followed and calculated by the evolution of their moments of order two. A quantitative calculation of the influence of turbulence on reaction rates is obtained by adding numerical calculation to analytical analysis. Author

N75-30368 California Univ., La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
STUDIES RELATED TO TURBULENT FLOWS INVOLVING FAST CHEMICAL REACTIONS c34
Paul A. Libby *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 18 p refs (For availability see N75-30359 21-31)

Turbulent flows involving chemical reactions in the simplest chemical system, fuel-oxidizer resulting in a single product are investigated. The conditions of the flow are assumed to be such that at a molecular level the reactions are infinitely fast. In this limiting case the properties of the turbulence determine the extent of chemical reaction. The physical picture of the chemical aspects of the flow which results from the assumption of fast chemistry and the experimental evidence to support this picture are emphasized. The mathematical consequences appropriate for the case of highly dilute reactions is then developed; it is shown that the crux of the problem of describing analytically the mean composition field resides in knowledge of rather detailed properties of a synthetic scalar quantity whose behavior can be related to that of a passive scalar in turbulent flows, for example, temperature or the concentration of helium in helium-air mixtures. In particular, it is shown that if at each point in the flow in question the probability density function of a synthetic scalar quantity is known, then the mean composition and the mean rate of creation of each species is determined. The results of calculations of a two-dimensional mixing layer with fuel in one stream and with oxidizer in the second stream are given. The results show the expected finite reaction zone. Author

N75-30369 Laboratoire d'Aerothermique du C.N.R.S., Meudon (France).
QUASI-EQUILIBRIUM METHOD FOR STUDY OF RELAXED FLOW [METHODE DE QUASI-EQUILIBRE POUR L'ETUDE DES ECOULEMENTS RELAXES] c34
R. Prudhomme *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 17 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

A quasi-equilibrium method which computes the evolution of a steady one dimensional relaxed flow is presented along with flow conservation equations written for a multireaction system. Numerical results are given for mixtures of H-H2 and H-H2-HF-F2. Other topics considered include integration stability, mass flow rate determination, and transonic zone. Author

N75-30370 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Space Div.
CALCULATION OF THE EFFECT OF AFTERBURNING IN EXTERNAL SUPERSONIC FLOW BY MEANS OF A METHOD OF CHARACTERISTICS WITH HEAT ADDITION AND MIXING LAYER ANALYSIS c34
P. Mittelbach *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 16 p refs (For availability see N75-30359 21-31)

A method is described for the calculation of the effect of afterburning in supersonic flow in the vicinity of a base body on the pressure distribution along this body. The basis for it is a method of characteristics, where the heat addition is prescribed. Information on the distribution of heat sources is gained by an analysis of the turbulent reacting mixing layer applying the Patankar/Spalding boundary layer program. Examples showing the usefulness of this approach are given. Author

N75-30371* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SUPERSONIC MIXING AND COMBUSTION IN PARALLEL INJECTION FLOW FIELDS c34
John S. Evans and Griffin Y. Anderson *In* AGARD Anal. and

Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 8 p refs (For availability see N75-30359 21-31)
CSCL 20D

Adequate prediction techniques for supersonic, mixing, reacting flows are of great importance in the design and performance analysis of supersonic combustion ramjet (scramjet) engines. Analytical programs for parallel injection flow fields with chemical reaction and turbulent mixing are now available for both single and multiple-jet flows. The application of these analyses to simple flow geometries is discussed, and comparisons also are made with data on the more complex case of multiple-jet, reacting flows. A review is given of Langley investigations of parallel injection flow fields. Among these are single-jet studies of nonreacting, turbulent mixing (H2 in air and H2 in N2), and of reacting turbulent mixing (H2 in air) with both single and multiple jets. Implications of the results of the studies for scramjet fuel injector design are discussed. Author

N75-30372 Naples Univ. (Italy). Inst. of Aerodynamics.
TURBULENT BOUNDARY LAYER IN HYBRID PROPELLANTS COMBUSTION **c34**
R. Monti *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 21 p refs (For availability see N75-30359 21-31)

Hybrid propellant combustion models (solid fuel and liquid oxidizer) are reviewed. The general equations for turbulent boundary layer combustion, together with the interface boundary conditions, are written. Combustion theories and working formula for solid fuel regression rates assume different orders of magnitude for the characteristic time ratios of the relevant processes (i.e. fuel vaporization, gas-phase chemical reactions, and oxidizer diffusion). It is shown that the models based on finite characteristic time for diffusion and chemical reaction explain the experimentally observed regression rate dependence on both mass flux and combustion pressure. Author

N75-30373 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
SOME PROBLEMS AND ASPECTS IN COMBUSTOR MODELLING **c07**
F. Suttrop *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 6 p (For availability see N75-30359 21-31)

Development of a theoretical combustor model that predicts CO and NO emissions and is applicable to industrial burners as well as gas turbines is described. Factors considered include: determination of the amount of NO formed in the flame front; selection of the correct rate constant for the reaction which controls NO formation; the temperature drop caused by radiation; and the effect of the initial amount of radicals on the NO formation. J.M.S.

N75-30374 Sheffield Univ. (England). Dept. of Chemical Engineering and Fuel Technology.
MEASUREMENT IN TURBULENT FLOWS WITH CHEMICAL REACTION **c34**
N. A. Chigier *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 18 p refs (For availability see N75-30359 21-31)

Measurements in turbulent flows are considered particularly for their relevance to the prediction of flows with combustion. The relative accuracy of instruments used for the measurement of velocity, temperature, gas, and solid concentrations is discussed and examples are given of changes in the magnitudes of flame properties as measuring techniques have improved. The requirement of varying the time period for averaging according to the local conditions is stressed and it is shown that, under certain conditions, the averaging procedure can conceal the physical nature of the phenomena that is being measured. The disturbance to the flow and the errors introduced by using water-cooled pitot tubes for velocity, suction pyrometers for temperature, and relatively large water-cooled suction probes for particle and gas analysis are discussed. It is argued that future measurements in flames should be made with laser probes and that all measurements should be made optically, without the introduction of physical probes. Developments in laser anemometry and laser Raman spectroscopy are reviewed. Examples are given of measurement by laser probes of velocity in flames with swirl and of temperature and specie concentration in turbulent diffusion flames. The important role of accurate measurement in the formulation and testing of analytical and numerical prediction theories is stressed. Author

N75-30375 Technische Hogeschool, Delft (Netherlands). Dept. of Mechanical Engineering.
SOME MEASUREMENTS AND NUMERICAL CALCULATIONS ON TURBULENT DIFFUSION FLAMES **c34**
Th. T. A. Paauw *In* AGARD Anal. and Numerical Methods for Invest. of Flow Field with Chem. Reactions, Especially Related to Combust. May 1975 11 p refs (For availability see N75-30359 21-31)

Measurements and the result of calculations are presented for the combustion flow field in a conical furnace, constructed so that boundary layer approximations are valid. Two types of flames are observed, an attached and a lifted flame. Measurements of temperature, velocity, and the mass fractions of N2, O2, CH4, and NO are obtained for the radial profiles at different distances along the cone. It is shown that the measured concentration of NO is sensitive to the flame type. Author

N75-30376*# Arizona Univ., Tucson. Optical Sciences Center.
MEASUREMENT OF DIMENSIONAL STABILITY Final Report, 6 Jun. 1972 - 5 Jun. 1975
S. F. Jacobs, J. W. Berthold, III, and M. Norton Jul. 1975 24 p refs
(Contract NAS8-28661)
(NASA-CR-143931) Avail: NTIS HC $3.25 CSCL 14B

A technique was developed for measuring, with a precision of one part 10 to the 9th power, changes in physical dimensions delta L/L. Measurements have commenced on five materials: Heraeus-Schott Homosil (vitreous silica), Corning 7940 (vitreous silica), Corning ULE 7971 (titanium silicate), Schott Zero-Dur, and Owens-Illinois Cer-Vit C-101. The study was extended to include Universal Cyclops Invar LR-35 and Simonds-Saw Superinvar. Author

N75-30377# Army Materiel Command, Alexandria, Va.
AMC GUIDE FOR DESIGN TO UNIT PRODUCTION COST (DTUPC)
17 Dec. 1974 82 p
(AD-A006214) Avail: NTIS CSCL 15/5

The purpose of this guide is to provide assistance to those functional activities of the U.S. Army Materiel Command (AMC) charged with the responsibility of estimating, applying, and/or controlling the design-to-cost concept. It is particularly concerned with the establishment of unit cost goals in development contracts as design parameters for production of hardware items. These specific development contract values managed by AMC are referred to as Design To Unit Production Cost (DTUPC) goals. This guide supplements basic information provided in the Joint Logistics Commander: conceptual guide on design-to-cost published October 1973. GRA

N75-30378# California State Div. of Highways, Los Angeles. Traffic Branch.
MONITORING FIELD INSTALLATIONS OF IMPACT ENERGY ATTENUATORS BY VIDEOTAPE Final Report
Robert A. Snyder, Phil C. Geib, and Ross C. Keeling Oct. 1974 82 p Prepared in cooperation with Calif. State Div. of Highways
(PB-241291/4; CA-HY-07-3134-2-74-01) Avail: NTIS HC $4.75 CSCL 13B

The report covers two years experience in monitoring three types of impact energy attenuators. A modified commercially available videotape recorder was used. A video camera using an infrared sensitive Tivicon tube was used to make night coverage possible. Some problems with flare from light sources was experienced. Recorded incidents ran all the way from high-speed head on crashes to numerous noncollision incidents. Attenuators are effective in saving lives, but more needs to be known about their effect on uninvolved traffic during collisions. GRA

N75-30379# Calspan Corp., Buffalo, N.Y.
REVIEW OF PROPOSED SPECIFICATIONS RELATING TO THE SHIPMENT OF ETHYLENE IN TANK CARS AT CRYOGENIC TEMPERATURES Final Report
F. A. Vassalo, D. E. Adams, and W. A. Bullerdiek Sep. 1974 33 p refs
(Contract DOT-FR-20069)
(PB-241380/5; CALSPAN-ZL-5226-D-2) Avail: NTIS HC $3.75 CSCL 13L

The study was limited in scope and was to be directed primarily at the holding time requirements necessary for safe shipment of the commodity. The insulation requirements based on a 30-day holding time capability with a design margin of 15 days are considered responsive to needs and are reasonable and practical within the current state of the art. A further definition of conditions for heat transfer calculations and measurement are suggested to assure consistent design and performance. Apparent deficiencies are noted in the proposed in-transit pressure rise specification; a candidate modification is described. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N75-30380 British Broadcasting Corp., Kingswood (England). Research Dept.
MAP PROJECTIONS FOR PLANNING OF BROADCASTING SERVICES: USE OF A DIGITAL COMPUTER
P. A. Laven and R. W. Lee Jul. 1975 15 p refs
(BBC-RD-1975/21) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Facilities for map production using a digital computer were developed. The use of a computer allows the choice of scale and projection, so that individual maps may be designed to satisfy specific requirements. Examples of these maps are presented and their uses in the planning of broadcasting services are described. Author

N75-30381 British Broadcasting Corp., Kingswood (England). Research Dept.
DIGITAL SOUND: BASEBAND FILTERING TO IMPROVE THE FADING MARGIN FOR 13-CHANNEL SYSTEM OPERATING OVER EXISTING FM LINKS
N. H. C. Gilchrist, W. I. Manson, and T. A. Moore Jul. 1975 11 p refs
(BBC-RD-1975/23) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

In order to realize as rapidly as possible the potential advantages of pulse code modulation, microwave frequency-modulation links, originally intended for monochrome video signals are being used to distribute sound programs to transmitters by multiplexed p.c.m. signals. However, for instrumental reasons the maximum carrier-deviation adopted for p.c.m. data must in some cases, be reduced below that used for video (8 MHz peak-to-peak). Means of recovering the loss of effective fading-margin caused by reduced deviation, and results of measurements carried out on a Post Office link and on a laboratory simulation are reported. It is concluded that the fading margin which applied when deviation is reduced by 8 db can be restored substantially, to within 1 db of the figure for full deviation, by means of a suitable baseband low pass filter at the receiving terminal. Author

N75-30382 British Broadcasting Corp., Kingswood (England). Research Dept.
FREQUENCY-DEPENDENT LIMITERS FOR FM SOUND BROADCASTING: OPTIMIZATION OF ATTACK PERIOD AND OF DELAY-LENGTH IN THE VARIABLE DE-EMPHASIS STAGE
W. I. Manson Jul. 1975 8 p refs
(BBC-RD-1975/22) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Following earlier experimental investigations on the problem of noticeable gain changes when conventional program limiters are used for FM sound transmissions, a variable-emphasis limiter arrangement was indicated as one solution. The arrangement comprised two limiter stages in cascade - the first regulating the level of the un-emphasized incoming program signals, and the second controlling, in a selective manner, the high-frequency input components raised above limiting level by pre-emphasis. In the original experimental equipment both stages were of a relatively complex design - each including a lumped-constant program signal delay network - to avoid momentary overshoot. Subjective tests indicate that the delay-line of the second stage may be omitted, with negligible program impairment, provided that certain simple precautions are taken. In particular, if the system demands no overshoot of any kind beyond certain limits that may set by a clipper at the output, the maximum steady-state output of the program limiter should be set below the clipping level by a margin of 0(75) db. Author

N75-30383 British Broadcasting Corp., Kingswood (England). Research Dept.
CEEFAX: UHF FIELD TRIALS
D. W. Stebbings Jan. 1975 12 p refs
(BBC-RD-1975/12) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Field trials were carried out using experimental CEEFAX data transmissions at the two information rates of 4(5) and 6(875) MBits/s. The purpose of the trials was to investigate the coverage or service area of CEEFAX in comparison to that of the associated color television signal, and to see if there were any special problems with the transmission and reception of CEEFAX which did not arise with color television. The results indicated that CEEFAX was a rugged transmission system and that in general the size of the service area for CEEFAX transmission was greater than that for color television. There was little difference in the sizes of the service area for either the low or high data bit-rates. Author

N75-30384# Signals Research and Development Establishment, Christchurch (England).
ATMOSPHERIC ATTENUATION OF MICROWAVE SATELLITE LINKS
R. F. Smith Jan. 1975 29 p refs
(SRDE-RN-73043; BR46637) Avail: NTIS HC $3.75

An attempt to establish statistics for atmospheric attenuation of microwave links involving satellites is described. Information obtained from a literature survey was used to derive curves giving the estimated percentage of a year for which a given attenuation is exceeded, for typical temperate and tropical climates. Author

N75-30385*# National Aeronautics and Space Administration, Washington, D.C.
SYSTEM AND METHOD FOR TRACKING A SIGNAL SOURCE Patent Application
Louis N. Mogavero, Edwin G. Johnsen (NBS), John M. Evans, Jr. (NBS), and James S. Albus, inventors (to NASA) (NBS) Filed 11 Jul. 1975 17 p
(NASA-Case-HQN-10880-1; US-Patent-Appl-SN-595254) Avail: NTIS HC $3.25 CSCL 17B

A system for tracking moving signal sources, particularly stage performers, is described. A miniature transmitter is attached to the person or object to be tracked and emits a detectable signal of a predetermined frequency. A number of detectors, positioned in a preset pattern, sense the signal and supply output information to a phase detector which applies signals representing the angular orientation of the transmitter to a computer. The computer provides command signals to a servo network which drives a device, such as a spotlight or camera, to track the moving transmitter 10. NASA

N75-30386*# Washington Univ., St. Louis, Mo. Center for Development Technology.
ALTERNATIVE COMMUNICATION NETWORK DESIGNS FOR AN OPERATIONAL PLATO 4 CAI SYSTEM
Robert E. Mobley, Jr. and Lester F. Eastwood, Jr. Aug. 1975 25 p refs
(Grants NGR-26-008-054; NSF EC-38871)

(NASA-CR-143330; CDTCG-R(T)-75/3) Avail: NTIS HC $3.25 CSCL 17B

The cost of alternative communications networks for the dissemination of PLATO IV computer-aided instruction (CAI) was studied. Four communication techniques are compared: leased telephone lines, satellite communication, UHF TV, and low-power microwave radio. For each network design, costs per student contact hour are computed. These costs are derived as functions of student population density, a parameter which can be calculated from census data for one potential market for CAI, the public primary and secondary schools. Calculating costs in this way allows one to determine which of the four communications alternatives can serve this market least expensively for any given area in the U.S. The analysis indicates that radio distribution techniques are cost optimum over a wide range of conditions. Author

N75-30387*# City Coll. of the City Univ. of New York. Communication Systems Lab.

OPTIMAL SPACE COMMUNICATION TECHNIQUES Final Report, 15 Jun. 1974 - 14 Aug. 1975

Donald L. Schilling 14 Aug. 1975 52 p refs

(Grant NsG-5013)

(NASA-CR-143337) Avail: NTIS HC $4.25 CSCL 17B

Encoding of video signals using adaptive delta modulation (DM) was investigated, along with the error correction of DM encoded signals corrupted by thermal noise. Conversion from pulse code modulation to delta modulation was studied; an expression for the signal to noise ratio of the DM signal derived was achieved by employing linear, 2-sample, interpolation between sample points. A phase locked loop using a nonlinear processor in lieu of a loop filter is discussed. Author

N75-30388# Joint Publications Research Service, Arlington, Va.

TRANSMISSION OF DATA OVER ELECTRIC POWER LINES

Ya. L. Bykhovskiy 30 Jul. 1975 37 p refs Transl. into ENGLISH from Inform.--Po Liniyam Elektroperedach (Moscow), 1971

(JPRS-65355) Avail: NTIS HC $3.75

A brochure, covering the description of communications equipment for electric power lines, and a review of the principal trends in the use of this type of communications for dispatcher control, the transmission of telemechanics signals, relaying, and automatic systems operations was introduced. Author

N75-30389# Joint Publications Research Service, Arlington, Va.

STANDARDIZATION IN RADIO-ELECTRONICS

V. V. Boytsov 21 Jul. 1975 191 p refs Transl. into ENGLISH from the book "Biblioteka Po Standartizatsii" Moscow, Izd. Standartov, 1970 p 1-351

(JPRS-65270-2) Avail: NTIS HC $7.00

An examination was made of the general problems of standardization in radio-electronics, the principal directions of research, the categories and forms of standards, and the requirements imposed on the quality and reliability of products. The problems of standardizing the components and units of radio apparatus and standardization of electronic and radio devices and communication resources were also examined. Author

N75-30390*# TRW Systems Group, Redondo Beach, Calif. Plasma Physics Group.

STUDY OF THE PERFORMANCE OF ANTENNAS IN MAGNETIZED PLASMAS Final Report

R. L. Stenzel 30 Jun. 1975 46 p refs

(Contract NAS8-31175)

(NASA-CR-143927; TRW-27468-6004-RU-00) Avail: NTIS HC $3.75 CSCL 17B

The antenna studies were performed in a large magnetized plasma source, a schematic drawing of which is shown. The plasma diagnostics consist of a 70 GHz (4 mm) microwave interferometer for density measurements and of various Langmuir probes for spatially resolved measurements of t sub e, n sub e and the shape of the electron distribution function. All diagnostic data are time-resolved by sample-and-hold techniques so as to yield information about the plasma build-up, the steady-state discharge, and the plasma decay in the afterglow. Whistler waves are excited and detected with various antennas which are inserted into the center of the plasma column through one axial and two orthogonal radial ports. The antennas were tested for their proper dipole response and then calibrated in a known field geometry in air. For the electric dipole, a parallel plate capacitor field was used; the magnetic loop is calibrated in the near-zone field of a long linear conductor of known radio frequency current distribution. Results are presented and discussed. Author

N75-30391*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

L-BAND, 1.2 m PARABOLIC ANTENNA-NOISE TEMPERATURE MEASUREMENT

Ralph E. Taylor and James S. Hill (RCA Service Co., Springfield, Va.) Jul. 1975 7 p refs Proposed for Presentation at the Intern. Telemetering Conf., Washington, D. C., 14-16 Oct. 1975 Submitted for publication

(NASA-TM-X-70952; X-953-75-186) Avail: NTIS HC $3.25 CSCL 17B

Extensive antenna-noise temperature measurements at 1.6 GHz (L-band) were made using a 1.2 m (4 ft. diameter) parabolic dish antenna mounted on the flying bridge of a modern 15,690-ton, commercial-container ship. Both in-harbor and at-sea radiometer measurements were made that indicated a steady background, antenna-noise temperature value slightly less than 70 degrees Kelvin (K) at elevation angles of 5 percent, and greater, at 1.6 GHz. A comparison of theoretical and measured values indicate excellent agreement within about 5K for at-sea data. These measurements are helpful to RF equipment designers of maritime, L-band shipboard terminals for operation with the two, geostationary, maritime satellites, Marisat-A and -B. Author

N75-30392*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DETERMINATION OF THE PROPERTIES OF DIELECTRIC LAYERS ON DIELECTRIC SUBSTRATES BY THE METHOD OF RADIO WAVE ELLIPSOMETRY

Siegfried Auer (P and P Industries, College Park, Md.) and John Schutt Jun. 1975 26 p refs

(NASA-TM-X-70942; X-923-75-148) Avail: NTIS HC $3.75 CSCL 17B

A concept is described whereby the physical principles of ellipsometry are applied to a simple soil/vegetation model. Although this model is simple, preliminary results for a more complex model show that the conclusions drawn from the simple model are realistic and correct as a first approximation. The following assumptions were made on the soil/vegetation model: (1) both soil and vegetation are pure dielectrics; their electrical conductivities are negligible; (2) both soil and vegetation are considered as homogeneous materials; and (3) the soil/vegetation interface and the vegetation surface are flat, smooth, parallel planes. Author

N75-30393# Joint Publications Research Service, Arlington, Va.

PECULIARITIES IN THE DEVELOPMENT OF REMOTE-COMMUNICATION METHODS

A. S. Blokhin 29 Aug. 1975 9 p Transl. into ENGLISH from Elektrosvyaz (Moscow), no. 4, 1975 p 12-17

(JPRS-65572) Avail: NTIS HC $3.25

Characteristics and general tendencies of the development of transmission systems are presented. A single automated communications system, organizationally and technically tying municipalities, towns, intra-oblast, and main-line networks, combines cable, radio relay, and air lines into a single system. Over the channels of this system are transmitted telephone, telegraph, television, radio, news, and various types of discrete information, as well as telemetering and remote-control signals for automated combines. Author

N75-30394# Council for Scientific and Industrial Research, Pretoria (South Africa).

PLAN FOR THE PROTECTION OF EHV NETWORKS AT THE 1975 TECHNICAL LEVEL

P. Deletang 1975 19 p Transl. into ENGLISH from Rev. Gen. Elec. (Paris), v. 83, no. 2, 1974 p 83-88 Presented at

Session 15 of the French Soc. of Elec., Electron., and Radioelectrical Engr., 25 Jun. 1973
(CSIR-Trans-1206) Avail: NTIS HC $3.25

A plan for the protection against short circuit and insulation faults is outlined. Problems arising from the protection of the lines, autotransformers, and bus bars are reviewed. Corresponding measuring procedures are also considered. Author

N75-30395# Ohio State Univ., Columbus. ElectroScience Lab.
COMPLEX NATURAL RESONANCES OF AN OBJECT IN DETECTION AND DISCRIMINATION
Richard K. Mains and David L. Moffatt Jun. 1974 53 p refs
(Contract F19628-72-C-0203; AF Proj. 5635)
(AD-A006199; ESL-3424-1; SR-1; AFCRL-TR-74-0282) Avail: NTIS CSCL 17/9

The report extends and formalizes the concept of using the complex natural resonances of objects as a tool in radar target discrimination. The complex natural resonances which characterize an object are found to be excitation invariant; i.e., the positions of the resonances in the complex frequency plane do not shift as the object is viewed along different incident directions or with different polarizations, which permit a minimum amount of data to be used in object discrimination. Once the dominant (low frequency or long time) natural resonances have been obtained for those objects of interest, a predictor-correlator type of processing can be applied to multi-frequency radar scattering data from an unknown target. It can be established from which of the known objects the scattering most likely originated. This done on the basis of correlations among the scattering and the various sets of natural resonances; the set of natural resonances showing the highest correlation identifies the most probable target. GRA

N75-30396# CNR, Inc., Newton Upper Falls, Mass.
LINE-OF-SIGHT TECHNIQUES INVESTIGATION Final Report, Mar. 1973 - May 1974
Phillip A. Bello, Charles J. Boardman, David Chase, and Joseph K. DeRosa Jan. 1975 364 p refs
(Contract F30602-73-C-0244)
(AD-A006104; RADC-TR-74-330) Avail: NTIS CSCL 17/2

This study is concerned with high data rate transmission/unit bandwidth over line-of-sight (LOS) microwave relay systems, which are an important element of the Defense Communication System (DCS). Most attention has been given to developing concepts for and evaluating the performance of high bits/sec/Hz modem techniques that could be used effectively with the DCS LOS microwave relay links, taking due consideration of the limitations imposed by the propagation medium, by military bandwidth constraints, and by existing equipments in the DCS. GRA

N75-30397# Clemson Univ., S.C. Dept. of Zoology.
RADAR ORNITHOLOGY: BIRD ECHOES ON WEATHER AND AIRPORT SURVEILLANCE RADARS Final Report
Sidney A. Gauthreaux, Jr. 1 Feb. 1975 52 p refs
(Grant AF-AFOSR-1974-71; AF Proj. 9777)
(AD-A006425; AFOSR-75-0317TR) Avail: NTIS CSCL 17/9

The use of radar to detect and monitor weather phenomena and to detect and control aircraft are well known, but relative few radar technicians and operators realize the importance of radar for detection of birds. The information in this report, presented in handbook form, was obtained from radar operated by the National Weather Service and the FAA. The techniques and information presented should aid radar operators in recognizing the various types of echoes from birds displayed on weather and air-traffic control radars, in estimating the numbers of birds passing over the radar stations, and in gathering information on the altitude of the birds aloft. Use of this information and techniques should be of great assistance in reducing the number of bird/aircraft collisions and improve flight safety. GRA

N75-30398# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
LOW FREQUENCY APPROACH TO TARGET IDENTIFICATION Interim Report
A. A. Ksienski, Y. T. Lin, and L. J. White 1975 44 p refs
(Grant AF-AFOSR-2611-74; AF Proj. 9769)
(AD-A008818; AFOSR-75-0539TR) Avail: NTIS CSCL 17/9

The paper presents a low frequency method for target identification, and its effectiveness is demonstrated for a large variety of objects varying in complexity from spheres and cubes to modern airplanes. A study of the selection of a discrete set of frequencies provides low misclassification error. A number of classification methods are examined using this discrete set of frequencies. It is shown that simple objects can be adequately classified by a linear discriminant method. For more complex targets, such as aircraft, a nearest neighbor approach is required. The introduction of phase and orthogonal polarization components are both found to further decrease misclassification error. A discussion of the trade off between the increased complexity and improved performance of various classification alternatives is provided. GRA

N75-30399# Army Electronics Labs., Fort Monmouth, N.J.
CORRUGATED HORNS
John L. Kerr and Michael J. Timochko Apr. 1975 30 p
(DA Proj. 1S7-62703-DH-93-W-1)
(AD-A009068; ECOM-4306) Avail: NTIS CSCL 09/5

This report describes the development of an antenna element suitable for use in a direction finding system. Corrugated horn and ridged waveguide techniques were utilized to provide the required characteristics of nearly equal performance for incident horizontal and vertical polarization and limited beamwidth variation with frequency over a bandwidth in excess of 2:1. Performance characteristics of several models are presented in the form of radiation patterns, VSWR, gain and beamwidth curves. GRA

N75-30400# Ballistic Research Labs., Aberdeen Proving Ground, Md.
COMPUTING METHODS USED IN SUPPORT OF MODELING ELECTRON CONCENTRATIONS IN HIGH ALTITUDE CHEMICAL RELEASES Final Report
R. B. Patton, Jr. Mar. 1975 35 p refs
(DA Proj. 1T1-61102-B-53)
(AD-A009069; BRL-MR-2453) Avail: NTIS CSCL 20/14

The modeling of electron concentrations for high-altitude chemical releases requires a number of supporting computations that have not been reported previously. These computing methods are presented in detail. They include six coordinate transformations, a solution for the position of a cloud's center based on line-of-sight data from a pair of observing sites, and a solution to describe cloud appearance (size, shape, and orientation) as viewed from a given location. GRA

N75-30401# Electronic Communications, Inc., St. Petersburg, Fla.
CIRCUIT QUALITY MONITOR Final Report, 26 May 1971 - 26 Mar. 1974
William L. Betts Feb. 1975 61 p refs
(Contract DAAB07-71-C-0272; DA Proj. 1H6-63707-D-246)
(AD-A009115; ECI-1-AER-0045; ECOM-0272-F-71) Avail: NTIS CSCL 17/2

This is the final report on the Circuit Quality Monitor program. Two advanced development models of the Circuit Quality Monitor have been built and tested. The monitor is a device which automatically measures and continuously displays the quality of voice bandwidth channels in the U.S. Army tactical toll system. Twelve channels and one self test channel are measured on a non-interfering basis once every fifteen minutes. Three degrees of quality are continuously displayed: usable for data, usable for voice but not high speed data, and unusable. Quality is measured in terms of amplitude spectrum, group delay spectrum, frequency offset, and message circuit noise. Channel traffic is monitored continuously on all channels and a low level non-interfering probe signal inserted when idle or when high level data traffic exist. Long integration time constants are implemented via phase locked loops to perform measurements at high negative signal to noise ratios. The channel performance parameters, measurement technique, implementation, and test results are described. GRA

N75-30402# Office of the Project Manager Army Tactical Communications Systems, Fort Monmouth, N.J.
DESCRIPTION OF ARMY TACTICAL COMMUNICATIONS ASSEMBLAGES AND EQUIPMENT

Jan. 1974 335 p
(AD-A006488) Avail: NTIS CSCL 17/2

Equipments and assemblages employable in Army Tactical Communications Systems are listed, described, and pictured in this document. The principle characteristics of radio sets and components used in ATACS assemblages are shown. ATACS equipment which has been transitioned to ECOM is also included since they are used in the overall ATACS environment. GRA

N75-30403# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ANALYSIS OF THE CRICHLOW GRAPHICAL MODEL OF ATMOSPHERIC RADIO NOISE AT VERY LOW FREQUENCIES M.S. Thesis

Kenneth E. Wilson Nov. 1974 179 p refs
(AD-A008679; GE/EE/74-65) Avail: NTIS CSCL 20/14

The Crichlow graphical model for the amplitude probability distribution (APD) of atmospheric radio noise (ARN) is analyzed. The model consists of two straight lines and a circular arc on Rayleigh paper. Formulas are obtained for the probability density function of the noise envelope in terms of the geometric descriptors of the APD. The Newton-Raphson method is applied to the density to solve for the geometric descriptors in terms of the statistical moments represented by the V sub d and L sub d ratios. The performance of the binary and M-ary coherent phase shift keyed communication system is predicted based upon the density of the graphical model and the less precise lognormal model. GRA

N75-30404# Aerospace Corp., El Segundo, Calif.

MILLIMETER WAVE TECHNOLOGY PROGRAM Interim Report

H. E. King, R. B. Dybdal, E. E. Epstein, J. D. Michaelson, and J. W. Montgomery 1 Apr. 1974 97 p refs
(Contract F04701-74-C-0075)
(AD-A008799; TR-0075(5650)-1; SAMSO-TR-75-97) Avail: NTIS CSCL 17/9

The purpose of the program is to develop and demonstrate a millimeter-wave Space Object Identification Radar System. It includes three responsibilities: (1) preparation of existing 15-ft millimeter antenna for radar installation; (2) definition and implementation of the acquisition and tracking system; and (3) performance of mission analysis for millimeter radars. The radar installation preparations for the 15-ft antenna are described. The acquisition and tracking system is defined and system errors are individually established; the hardware and software necessary for implementation of this system are partially complete. The mission analysis tasks include investigation of millimeter radar-capabilities and 93-GHz scattering measurements on typical satellite materials, structural components, and visible sensors. GRA

N75-30405# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A RADAR ERROR MODEL AND KALMAN FILTER FOR PREDICTING TARGET STATES IN AN AIR-TO-AIR ENVIRONMENT M.S. Thesis

Eric Kent Lindberg Nov. 1974 129 p refs
(AD-A008671; GA/EE/74-2) Avail: NTIS CSCL 15/7

Various extended Kalman filters and modified nonlinear filters are examined for target acceleration estimation over a representative trajectory. The filters are of two basic types. The first type uses the radar measurements in the antenna centerline coordinate frame to provide the Kalman filter measurements. The propagation equations for this implementation have position, velocity, and acceleration as the states in a convenient inertial reference frame. In comparison, the second type performs propagation and measurement equations computations entirely in the antenna centerline frame. Each type of filter is tested for any degradation of performance apparent from excluding radar measurements of the error angles between the antenna centerline and line-of-sight reference frame. GRA

N75-30406# Maryland Univ., College Park. Computer Science Center.

ARQ ERROR CONTROL ON SATELLITE CHANNELS WITH HIGH ERROR RATES Interim Report

A. R. K. Sastry Sep. 1974 29 p refs
(Grant AF-AFOSR-1982-71; AF Proj. 9769)
(AD-A008790; TR-327; AFOSR-75-0538TR) Avail: NTIS CSCL 17/2

Some variations of the automatic repeat-request (ARQ) System of error control, the widely used system on terrestrial links, are considered suitable even for satellite links. The major problem is that the large round trip delay associated with satellite channels reduces the throughput, more drastically under high error rate conditions. Further, ground segments that usually accompany satellite circuits at both ends introduce bursts of errors, during which block error rates tend to be quite high, bringing down the throughput to very low values. In the report, some of the implications of using ARQ for error control on satellite links are briefly explained and some schemes that modify the currently used variations of ARQ are suggested with a view to obtain larger throughput under high block error rate conditions. GRA

N75-30407# IIT Research Inst., Chicago, Ill.

ELF INTERFERENCE FIELDS DUE TO A FINITE LINE ANTENNA

Alan A. Doehrer Mar. 1975 36 p refs
(Contract N00039-73-C-0030)
(AD-A008582; IITRI-E6249) Avail: NTIS CSCL 20/14

The theories for predicting the electric field due to an ELF finite line antenna source are reviewed. These theories are based on a uniform earth model. They have been put into computer program form and used to calculate the electric field strength for several different ELF sources. The program is developed with the objective of being used in the design of interference mitigation for large-scale utility systems. GRA

N75-30408# Harry Diamond Labs., Adelphi, Md.

RADAR-MODELING STUDY

Murry B. Ginesberg and John C. Costanza Dec. 1974 44 p ref Sponsored by the Army
(AD-A009055; HDL-TR-1672) Avail: NTIS CSCL 17/9

Radar detection theory is used to develop mathematical models for determining the potential of a scanning pulse acquisition radar to detect a nonmaneuvering, nonjamming, low-altitude target. The ground-based acquisition radar scans with a pencil-beam antenna pattern, and the target radar cross section is characterized by scan-to-scan fluctuation (Swerling Case 1). In addition to studying detection in free space, the effects of multipath propagation and ground clutter are evaluated. Computer programs, given in APL language, dynamically simulate the radar-target encounter. GRA

N75-30409# Harris Corp., Melbourne, Fla. Electronic Systems Div.

DEVELOPMENT OF SOLID-STATE TRANSPORTABLE SATELLITE COMMUNICATIONS TERMINAL

15 Mar. 1974 141 p Sponsored by the Army
(AD-A008708) Avail: NTIS CSCL 17/2

The report describes the development by radiation of X-band solid-state frequency converters as part of a transportable terminal for use with the military DSCS-11 communications satellite. The converters are fully self-contained in two 3-1/2 inch rack-mounting drawers. They provide the capability for translating a signal anywhere in the 7.25-7.75 GHz receive band down to 70 MHz and, similarly, of translating a 70 MHz signal up to the 7.9-8.4 GHz transmit band. Hybrid microwave integrated circuit (HMIC) techniques were employed extensively in the terminal converters to aid in minimizing size and weight and in enhancing reproducibility. The actual construction is a blend of microstrip and stripline distributed circuits and miniaturized lumped-element circuits. GRA

N75-30410# California Univ., Santa Barbara. Dept. of Electrical Engineering.

OPTIMAL FILTERING IN THE PRESENCE OF MULTIPLICATIVE NOISE Interim Report

C. Johnson (GE Co., Santa Barbara, Calif.) and Edwin B. Stear 1974 14 p refs
(Grant AF-AFOSR-2166-72; AF Proj. 9769)
(AD-A008728; AFOSR-75-0556TR) Avail: NTIS CSCL 09/4

Optimal filtering for a specific class of nonlinear, discrete dynamical systems having multiplicative input noise and multiplica-

tive measurement noise is studied. The most general solution is the probability density function of the state conditioned on the measurements. Fundamental to the recursive solution derived in this study are the lognormal probability laws assumed for the multiplicative input noise and the multiplicative measurement noise. The basic theory is developed for a scalar system with positive state. The conditions for stability of the optimal estimate (i.e., conditional expectation) are also derived. The theory is then extended to a scalar system where the state can be either positive or negative. GRA

N75-30411# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
HIGH ACCURACY AIRCRAFT TO SATELLITE TRACKING USING AN EXTENDED KALMAN FILTER M.S. Thesis
Robert A. K. Mitchell Dec. 1974 166 p refs
(AD-A008716; GA/EE/74-3) Avail: NTIS CSCL 17/9

A 61-state truth model is developed for the aircraft to satellite tracking problem. The equations for the extended Kalman filter are described and the truth model is examined and simplified to give a 12-state reduced order filter model of the system. Using the method of Covariance Analysis which is described, the performance of the 12-state filter model against the 61-state truth model is evaluated with the dynamics profile of a high altitude aircraft tracking a near earth satellite in a circular polar orbit. GRA

N75-30412# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELECTROMAGNETIC WAVE PROPAGATION IN PERIODIC MEDIA M.S. Thesis
Roger M. Hall Dec. 1974 111 p refs
(AD-A008715; GE/EE/74-44) Avail: NTIS CSCL 20/14

The study investigates the propagation of electromagnetic waves in a rectangular waveguide which contains a periodically varying unidirectionally inhomogeneous medium. Variations of both permittivity and permeability in the direction of propagation are considered. It is shown that the solution to this problem leads to a form of the Hill differential equation. Two methods for solving this equation are presented. The first is Hill's method of solution and the second is a transmission matrix form of solution. A characteristic equation, derived from the Hill equation, is used to predict wave propagation characteristics. Several media are analyzed and passbands and stopbands are predicted for each configuration. The effects of varying medium period and parameters are studied. Experimental verification of a number of cases is presented and compared with predicted results. GRA

N75-30413# Denver Research Inst., Colo.
BROADBAND COMMUNICATIONS IN RURAL AREAS. NATIONAL COST ESTIMATE AND CASE STUDIES
Paul Bortz, Robert Spongberg, and Fred Venditti Nov. 1973 67 p refs
(PB-241039/7) Avail: NTIS HC $4.25; Also Avail: SOD HC $8.00/set of 2 reports as PB-241037-SET CSCL 17B

The objectives of the study were: (1) to develop capital and operating cost estimates for nationwide development of integrated rural broadband service, for service and levels of at least three and at least five channels of television; (2) analyze in detail the costs and configurations of integrated rural broadband systems in two selected areas, northcentral Tennessee and northwest South Dakota. GRA

N75-30414# Texas Univ., Austin.
COMPLEX REFRACTIVE INDEX OF ICE FOG AT A RADIO WAVELENGTH OF 3 mm
John W. Perry, Archie W. Straiton, and Bob M. Frannin Oct. 1974 105 p
(Contract DA-ENG-27021-73-G39; ARPA Order 1615)
(AD-A008870; CRREL-TR-255) Avail: NTIS CSCL 20/4

An investigation of the complex index of refraction at 97 GHz for low temperature ice fogs was carried out over the temperature interval -30 to -48C in a specially constructed environmental chamber of approximately 70 cubic foot volume. GRA

N75-30415# Georgia Inst. of Tech., Atlanta.
AUDIO TRANSDUCER RESEARCH Final Technical Report, 29 Jun. 1973 - 31 Dec. 1974
F. Dixon, M. E. Sikorski, F. R. Williamson, and R. A. Newson Apr. 1975 44 p
(Contract DAAB07-73-C-0238; DA Proj. 1S7-62701-AH-92-NI)
(AD-A009113; ECOM-73-0238-F) Avail: NTIS CSCL 17/2

Audio transducers based on the piezoresistive and stressed-transistor principles have been investigated for possible use in future tactical communications systems-the goal being to develop small, light-weight, hands-free microphones that can operate satisfactorily in a high noise environment. The study has focussed on contact-type devices coupled more or less directly with the surface of the head or neck. GRA

N75-30416# Facility Checking Squadron (1866th) (AFCS), Richards-Gebaur AFB, Mo.
COMMUNICATIONS STATION EVALUATION REPORT, VANCE AFB, OKLAHOMA TRACALS Evaluation Report
Bruce E. Wallachy Oct. 1974 74 p
(AD-A008798; ; Rept-74/66C/25) Avail: NTIS CSCL 17/7

A Traffic Control and Landing Systems (TRACALS) Communications Station evaluation was performed at Vance AFB, OK (2110 Comm Sq) 7 through 16 October 1974. The purpose of the evaluation was to define the capabilities and limitations of the Air Traffic Control VHF/UHF communication system. Included in this report are results and analysis of equipment checks, a loop test line level diagram, line of sight coverage data, and results and analysis of airborne measurements. The data presented in the report can be used as a guide for anticipated performance of the system until there is an addition, deletion, relocation of equipment, or change in horizon profile which would affect the system. GRA

N75-30417# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROSPECTS FOR DEVELOPMENT OF REMOTE CABLE TELECOMMUNICATION TECHNIQUES
Joseph Vrba 12 Mar. 1975 16 p Transl. into ENGLISH from PTT (Czechoslavakia), v. 4, no. 5, 1973 p 14-16
(AD-A008629; FTD-HC-23-0847-75) Avail: NTIS CSCL 17/2

From a review of the development of long distance telecommunication devices, it is obvious that the main transmission mode in the next 15 to 20 years worldwide will still be the classical coaxial cable, used mainly for the FDM systems and used on a broad scale for the PCM systems. For the needs of high capacity bundles, data transfer, and integrated networks, the PCM technique has good prospects combined with the use of coaxial cables, wave guides and light guides. GRA

N75-30418# Illinois Univ., Urbana. Coordinated Science Lab.
ON MINIMAX DECISION THEORY: A BANACH SPACE APPROACH Ph.D. Thesis
Gyorgy Hexner Oct. 1974 121 p refs
(Contract DAAB07-72-C-0259; Grants AF-AFOSR-2570-74; AF-AFOSR-1579-68)
(AD-A009092; R-666; UILU-ENG-74-2232) Avail: NTIS CSCL 17/9

In this thesis, three classes of minimax estimation problems are studied. These problems are models for various situations in which worstcase type estimates are desired. One such situation is the radar tracking of hostile, evasive vehicles. GRA

N75-30419# TRW, Inc., Lawndale, Calif. Semiconductor Div.
PRODUCTION ENGINEERING MEASURE FOR AN INTEGRATED CIRCUIT POWER AMPLIFIER 600-1000 MHz FOR TACTICAL RADIO EQUIPMENT Quarterly Report, 1 Oct. - 31 Dec. 1974
Roger C. DeBloois Dec. 1974 23 p
(Contract DAAB05-72-C-5844)
(AD-A009008; QR-11) Avail: NTIS CSCL 17/2

The project is intended to provide for production engineering to manufacture an amplifier with the following characteristics: 30 watts output power; input impedance, 50 ohms; output impedance, 50 ohms; frequency band, 600-1000 MHz. The amplifier will utilize the TRW MICroAMP(TM) broadband transistor which will be optimized as part of this project. Two of these devices will then be combined using 90 degree interdigitated couplers to produce a minimum of 30 watts of power. This amplifier will be adaptable for use as a building block for the

fabrication of higher power systems. The mask set was redesigned to incorporate the changes necessary for increased amplifier gain. Three engineering sample amplifiers were fabricated, tested, and shipped. Approval to start the First Article Amplifiers was obtained and these amplifiers were started. GRA

N75-30420# Army Missile Research, Development and Engineering Lab., Redstone Arsenal, Ala. Aeroballistics Directorate.

PSEUDO-RANDOM CODED CW RADAR FOR TARGET DETECTION IN CLUTTER

Abraham H. Haddad and Robert Fletcher 1 Aug. 1974 20 p (AD-A008964; RD-75-25) Avail: NTIS CSCL 17/9

The performance of optimal and suboptimal detection schemes in the presence of clutter using pseudo-random coded CW radar is investigated. Several performance parameters are optimized and their bounds derived. GRA

N75-30421# Army Aeromedical Research Lab., Fort Rucker, Ala.

COMMUNICATION DURING TERRAIN FLIGHT Final Report

Michael G. Sanders, Mark A. Hofmann, Donald F. Harden, and Thomas L. Frezell Mar. 1975 46 p refs

(AD-A009336; USAARL-75-13) Avail: NTIS CSCL 05/9

Safe and efficient terrain flight requires that the copilot or navigator give verbal navigation instructions that allow the pilot to respond quickly and effectively with minimum confusion and head-in-cockpit time. The intracockpit communications of forty-seven Nap-of-the-Earth (NOE) training flights were tape recorded. NOE communication questionnaires were developed and administered to sixty student pilots and seventy-four instructor pilots. Analysis of the tapes and questionnaire data indicated that the crew members were spending 30.1 percent of their time in communication concerning navigation. Analysis of the tape recordings also indicated that new student pilot (SP) flight crews exhibited a greater density of communication ($t = 10.07$, $df = 45$, p smaller than .05) than did the SP flight crews that had been flying together. Seventy-seven percent of the IPs indicated that formal navigation communication instructions presented in the classroom would be more desirable than IPs teaching their students individually the navigation terms and techniques that should be used. GRA

N75-30422# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

RADAR AMBIGUITY FUNCTION FOR RANDOM INTRAPULSE-MODULATED RADAR SIGNALS M.S. Thesis

Herman N. Hebert Dec. 1974 70 p refs

(AD-A009202; GE/EE/74-50) Avail: NTIS CSCL 17/9

The radar ambiguity function for random intrapulse-modulated signals with constant frequency and amplitude for each sub-pulse was considered. The amplitude and frequency of each sub-pulse were random variables. The amplitude modulation (AM) and frequency modulation (FM) indices and the number of sub-pulses were varied, and their effects on the statistical expectation and the simulated average of the ambiguity function were studied to see if resolution capabilities could be determined. It was assumed that the averaged ambiguity function is an effective means of determining resolution capabilities. It was found that changes in the AM index had no appreciable effect on the ambiguity functions, while changes in the FM index did. Changes in the number of sub-pulses did not affect the central spike of the statistical ambiguity function. No variations from that of an unmodulated pulse were noted in the ambiguity functions along the Doppler frequency axis. Further research was suggested for a more sophisticated class of signals. GRA

N75-30423# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ELECTROMAGNETIC WAVE PROPAGATION AND INVERSE BREMSSTRAHLUNG ABSORPTION IN SUDDENLY-CREATED PLASMAS M.S. Thesis

Carl R. Scheerer Mar. 1975 66 p refs

(AD-A009210; GEP/PH/75-12) Avail: NTIS CSCL 20/14

Electromagnetic wave propagation and inverse bremsstrahlung absorption in suddenly-created plasmas are studied in this investigation. Maxwell's equations are used to determine the Laplace transformations of the electromagnetic field expressions for plane wave propagation in a source-free region and for a general dispersion equation which relates the wavenumber k to the complex frequency s. Thus, the fields in the time domain are determined by inverse Laplace transformations using the dispersion relation that is consistent with the plasma under consideration. The investigation considers two different plasma models. The first area of investigation involves a plasma that is homogeneous, isotropic, linear and slightly lossy. The second area of investigation involves a plasma with a magnetic field parallel to the direction of propagation of the original wave. GRA

N75-30424# Federal Communications Commission, Washington, D.C. Research and Standards Div.

CONVOLUTION METHOD OF INTERFERENCE CALCULATION. USER'S MANUAL AND RESULTS

Allen Das and George Sharp Apr. 1975 88 p refs

(PB-241306/0; FCC/OCE/RS75-04) Avail: NTIS HC $4.75 CSCL 17B

Using convolution integrals, this program calculates the noise power ratio and the interference power of a desired frequency modulated signal from an interfering signal, such as single channel per carrier (SCPC), signal. The amount of interference power from a SCPC circuit into a 1200 channel frequency modulated signal is dependent on the carrier frequency of the SCPC circuit relative to the carrier frequency of the desired signal. GRA

N75-30425# Federal Communications Commission, Washington, D.C. Research and Standards Div.

UCAP, UHK-TV CHANNEL ASSIGNMENT PROGRAM

Gary S. Kalagian Jan. 1975 89 p

(PB-241307/8; FCC/OCE/RS75-02) Avail: NTIS HC $4.75 CSCL 17B

The UHF-TV channel assignment program is a FORTRAN computer program capable of producing UHF-TV channel assignment tables. Each table is produced by changing the input parameters, which are: the taboo separation distances and the UHF channel numbers in the range LOW to HIGH. Each table is subject to the following conditions: (1) the range of channel numbers (HIGH-LOW) must not exceed 48 channels; (2) channel number 37 is not used; (3) existing occupied assignments having a channel number greater than HIGH are given first priority for a reassigned number in the range LOW-HIGH; (4)existing occupied assignments in the range 14-HIGH are not reassigned; and (5) as many as possible of the existing unoccupied assignments in the channel range 14-83 are reassigned to the range LOW-HIGH. GRA

N75-30426# Denver Research Inst., Colo.

BROADBAND COMMUNICATIONS IN RURAL AREAS Final Report

Paul Bortz, Robert Spongberg, and Fred Venditti Nov. 1973 116 p refs Sponsored by Office of Telecommunications Policy (PB-241038/9) Avail: NTIS HC $5.25; HC also available in a set of 2 reports as PB-241037-SET $8.00 CSCL 17B

The objective of the study was to identify, describe, and analyze alternative technological systems for delivering broadband communications services to rural areas. The analyses were directed towards finding economical system configurations for conserving and enhancing broadband services in low population density areas. GRA

N75-30999 Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).

RECENT RESULTS OF ELECTRONICALLY CONTROLLED RADAR RESEARCH [NEUERE FORSCHUNGSERGEBNISSE ZUM ELEKTRONISCH GESTEUERTEN RADAR]

I. Groeger, E. Hanle, G. VanKeuk, W. D. Wirth, and L. F. Himburg (Bundesmin. der Verteidigung) *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 137-161 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-30427 British Library Lending Div., Boston Spa (England).
PROBLEMS OF THE ARC AND CONTROL OF IONISATION AND PLASMA AROUND CURRENT ZERO IN h.v. CIRCUIT
B. Calvino 24 Apr. 1975 25 p refs Transl. into ENGLISH from French Report Presented at Proceedings of the Colloquium on h. v. Ionisation and Plasma, Liege, 1974
(BLL-CE-Trans-6646-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons

The problems of ionization and plasma in a circuit-breaker interrupter chamber were examined by varying certain parameters of the test circuit. The equipment, test methods, and results of the investigation are described. M.J.S.

N75-30428* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INTEGRABLE POWER GYRATOR Patent
Erwin S. Hochmair, inventor (to NASA) (NAS-NRC) Issued 5 Aug. 1975 11 p Filed 18 May 1973 Supersedes N73-24236 (11 - 15, p 1756) Sponsored by NASA
(NASA-Case-MFS-22342-1; US-Patent-3,898,578; US-Patent-Appl-SN-361666; US-Patent-Class-330-63; US-Patent-Class-330-18; US-Patent-Class-330-40; US-Patent-Class-330-13) Avail: US Patent Office CSCL 09A

A gyrator circuit is operated at high power levels of the conventional configuration of two amplifiers in a circular loop, one producing zero phase shift and the other producing 180 deg phase reversal. Two differential amplifiers are connected to the junction of two, complementary transistors so that output operation is class B. Each of the complementary transistors is connected to control two transistors in parallel, one of large conductive geometry and in a low resistance circuit and the other of small conductive geometry and in a resistance circuit. In a nonreciprocal embodiment, only the input port accommodates high power. Greatly increased efficiency is realized.
Official Gazette of the U.S. Patent Office

N75-30429* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ISOLATED OUTPUT SYSTEM FOR A CLASS D SWITCHING-MODE AMPLIFIER Patent
Martial A. Honnell, inventor (to NASA) (Auburn Univ.) Issued 12 Aug. 1975 8 p Filed 26 Apr. 1974 Supersedes N74-21859 (12 - 13, p 1527) Sponsored by NASA
(NASA-Case-MFS-21616-1; US-Patent-3,899,745; US-Patent-Appl-SN-464723; US-Patent-Class-330-207A; US-Patent-Class-330-24) Avail: US Patent Office CSCL 09C

A class D amplifier for the amplification of signals having unipolar or bipolar direct current, or alternating current is described. Positive and negative signal channels and a transformer-coupled output circuit for each channel are included. A switching circuit which effects isolation of the non-operating channel from the operating channel as a function of signal polarity is also described. Official Gazette of the U.S. Patent Office

N75-30430* National Aeronautics and Space Administration. Pasadena Office, Calif.
REFRIGERATED COAXIAL COUPLING Patent
Ervin R. Wiebe (JPL) and Robert C. Clauss, inventors (to NASA) (JPL) Issued 26 Aug. 1975 7 p Filed 27 Jun. 1974 Supersedes N74-2789 (12 - 17, p 2014) Sponsored by NASA
(NASA-Case-NPO-13504-1; US-Patent-3,903,143; US-Patent-Appl-SN-483852; US-Patent-Class-333-21R; US-Patent-Class-333-83BT; US-Patent-Class-33-96; US-Patent-Class-333-98R) Avail: US Patent Office CSCL 09C

A transmission line for improving the sensitivity of a maser or other microwave processing equipment by using a cooled coaxial line for coupling a waveguide to a refrigerated maser, is discribed. The central coaxial conductor has an outer end projecting into the waveguide and covered by a quartz dome. The space between the central and outer conductors of the coaxial line is evacuated to minimize heat transfer, the central coaxial conductor is supported by the outer conductor at its inner end which is refrigerated to less than 5 Kelvin, and the central coaxial conductor is a short solid copper rod to maintain the outer end at a low temperature. Official Gazette of the U.S. Patent Office

N75-30431* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
DUAL DIGITAL VIDEO SWITCHER Patent
Ian A. Richter, inventor (to NASA) Issued 19 Aug. 1975 16 p Filed 25 Sep. 1973 Supersedes N73-32063 (11 - 23, p 2757)
(NASA-Case-KSC-10782-1; US-Patent-3,900,705; US-Patent-Appl-SN-400467; US-Patent-Class-178-6.8; US-Patent-Class-178-DIG.1) Avail: US Patent Office CSCL 09C

A system is described for manually and automatically coupling video signals from a plurality of cameras to a monitoring apparatus. The system is comprised of a manual mode of operation, a continuous scan mode, a single scan mode, and a hold condition. The scanning mode is controlled by a shift register which is activated at various rates so as to vary the duration that a particular video signal is coupled to the monitoring apparatus. If the system is in the scan mode a push button can be depressed to hold the video signal coupled to the monitoring system until the operator desires to return to the scan cycle. Various logic circuits are utilized in the system for selecting a predetermined scanning sequence, as well as to permit the circuit to be manually operable under control of an operator.
Official Gazette of U.S. Patent Office

N75-30432 Radiotechnique-Compelec, Paris (France).
PRINTED CIRCUITS ADAPTED FOR LOGICAL ULTRA-FAST CIRCUITS Final Report [CIRCUITS IMPRIMES ADAPTES AUX IMPERATIFS. LES CIRCUITS LOGIQUES ULTRA-RAPIDES]
J. P. Golest, C. Barre, and G. Nocture May 1974 15 p In FRENCH
(Contract DGRST-73-7-1341)
Avail: Issuing Activity

A feasibility study of printed circuits with engraved resistors is presented. The image variables of integrated circuits with current commutation were studied with regard to electrical parameters, crosstalk, and thermal dissipation. The resistors were made with Micaply-Ohmega material. Techniques for multilayer circuits are detailed. A digital counter was made and tested in normal usage conditions at clock frequencies higher than 80 MHz. ESRO

N75-30433*# Radio Corp. of America, Camden, N.J. Advanced Technology Labs.
CMOS ARRAY DESIGN AUTOMATION TECHNIQUES
P. Ramondetta, A. Feller, R. Noto, and T. Lombardi May 1975 68 p refs
(Contract NAS12-2233)
(NASA-CR-120683) Avail: NTIS HC $4.25 CSCL 09C

A low cost, quick turnaround technique for generating custom metal oxide semiconductor arrays using the standard cell approach was developed, implemented, tested and validated. Basic cell design topology and guidelines are defined based on an extensive analysis that includes circuit, layout, process, array topology and required performance considerations particularly high circuit speed. Author

N75-30434*# Hughes Aircraft Co., Culver City, Calif. Dept. of Microcircuit.
CONTAMINATION CONTROL IN HYBRID MICROELECTRONIC MODULES. IDENTIFICATION OF CRITICAL PROCESS AND CONTAMINANTS, PART 1 Final Report
R. P. Himmel May 1975 38 p refs
(Contract NAS8-30876)
(NASA-CR-143380; P75-111; HAC-REF-D-1927) Avail: NTIS HC $3.75 CSCL 09C

Hybrid processes, handling procedures, and materials were examined to identify the critical process steps in which contamina-

tion is most likely to occur, to identify the particular contaminants associated with these critical steps, and to propose method for the control of these contaminants. Author

N75-30435*# Sedco Systems, Inc., Farmingdale, N.Y.
HIGH POWER FERRITE MICROWAVE SWITCH
Irwin Bardash and Nicholas K. Roschak [1975] 102 p ref
(Contract NAS3-16752)
(NASA-CR-134774) Avail: NTIS HC $5.25 CSCL 09C

A high power ferrite microwave switch was developed along with associated electronic driver circuits for operation in a spaceborne high power microwave transmitter in geostationary orbit. Three units were built and tested in a space environment to demonstrate conformance to the required performance characteristics. Each unit consisted of an input magic-tee hybrid, two non-reciprocal latching ferrite phase shifters, an out short-slot 3 db quadrature coupler, a dual driver electronic circuit, and input logic interface circuitry. The basic mode of operation of the high power ferrite microwave switch is identical to that of a four-port, differential phase shift, switchable circulator. By appropriately designing the phase shifters and electronic driver circuits to operate in the flux-transfer magnetization mode, power and temperature insensitive operation was achieved. A list of the realized characteristics of the developed units is given. Author

N75-30436# Joint Publications Research Service, Arlington, Va.
SPACE CENTER ELECTRONIC EQUIPMENT
A. Militsin and A. Grigorenko 4 Aug. 1975 9 p Transl. into ENGLISH from Radio (Moscow), no. 4, 1975 p 10-12
(JPRS-65382) Avail: NTIS HC $3.25

A description is given of electronic control facilities at the U.S.S.R. Ground Flight Control Center. Author

N75-30437*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A COMPUTER PROGRAM FOR CALCULATION OF SPECTRAL RADIATIVE PROPERTIES OF GAS MIXTURES
John E. Nealy Washington Aug. 1975 88 p refs
(NASA-TN-D-7845; L-9745) Avail: NTIS HC $4.75 CSCL 07D

A computer code is described whereby calculations of radiative properties of gas mixtures may be made. The program is arranged so that distinct radiative processes for each species are computed in individual subroutines. Provision is made for calculating radiative properties in nonequilibrium situations - separate rotational, vibrational, and electronic temperatures may be used. These features should provide a flexibility not currently available in such programs. The basic equations and the program listing in FORTRAN 4 language are presented. Sample calculations are given for high temperature air and carbon dioxide and are compared to calculations made with previously developed programs. Author

N75-30438*# Duke Univ., Durham, N.C. Dept. of Electrical Engineering.
DESIGN OF ENERGY STORAGE REACTORS FOR dc-TO-dc CONVERTERS Ph.D. Thesis
De Yu Chen 18 Aug. 1975 188 p refs
(Grant NGL-34-001-001)
(NASA-CR-143327) Avail: NTIS HC $7.00 CSCL 09C

Two methodical approaches to the design of energy-storage reactors for a group of widely used dc-to-dc converters are presented. One of these approaches is based on a steady-state time-domain analysis of piecewise-linearized circuit models of the converters, while the other approach is based on an analysis of the same circuit models, but from an energy point of view. The design procedure developed from the first approach includes a search through a stored data file of magnetic core characteristics and results in a list of usable reactor designs which meet a particular converter's requirements. Because of the complexity of this procedure, a digital computer usually is used to implement the design algorithm. The second approach, based on a study of the storage and transfer of energy in the magnetic reactors, leads to a straightforward design procedure which can be implemented with hand calculations. An equation to determine the lower-bound volume of workable cores for given converter design specifications is derived. Using this computer lower-bound volume, a comparative evaluation of various converter configurations is presented. Author

N75-30439*# Ohio Univ., Athens. Dept. of Electrical Engineering.
A SIMULATION ANALYSIS OF PHASE PROCESSING CIRCUITRY IN THE OHIO UNIVERSITY OMEGA RECEIVER PROTOTYPE M.S. Thesis
R. A. Palkovic Jun. 1975 57 p refs
(Grant NGR-36-009-017)
(NASA-CR-132707) Avail: NTIS HC $4.25 CSCL 09C

A FORTRAN 4 simulation study of the all digital phase processing circuitry is described; the digital phase lock loop (DPLL) is the major component of the Omega navigation receiver prototype. Through the DPLL, the phase of the 10.2 KHz Omega signal is estimated when the true signal phase is contaminated with noise. Loop performance in a variety of noise environments and evaluation of design changes in the system are made possible by the DPLL. Author

N75-30440*# RCA Research Labs., Montreal (Quebec).
LITHIUM DRIFTED GERMANIUM SYSTEM Final Report
E. J. Fjarlie Sep. 1969 62 p
(Contract NAS9-9377)
(NASA-CR-144407; Res-96151-1) Avail: NTIS HC $4.25 CSCL 09C

General characteristics of the lithium-drifted germanium photodiode-Dewar-preamplifier system and particular operating instructions for the device are given. Information is included on solving operational problems. Author

N75-30441# Sperry Rand Research Center, Sudbury, Mass.
TRAPATT AMPLIFIER Final Report, 1 Feb. 1973 - 1 Jun. 1974
Harry Kroger and Martin I. Grace Jan. 1975 104 p refs
(Contract F30602-73-C-0085)
(AD-A005680; SCRC-CR-74-4; RADC-TR-74-261) Avail: NTIS CSCL 09/5

The report describes the design and development of a wideband TRAPATT amplifier whose output power is of the order of 30 W. Particular attention is focused upon the utility of ring diodes for non CW (high peak power) applications together with descriptions for reducing or eliminating surface degradation effects. An amplifier broadbanding technique based on the design principles of the lumped-element circuit is described, and a realization of such an equivalent circuit is described. The operation of large-area ring diode amplifiers is described along with the Class C (rf-triggered) mode of operation. GRA

N75-30442# Electromask, Inc., Woodland Hills, Calif.
A PHOTOLITHOGRAPHIC PROCESS TO PRODUCE PHOTOMASKS FOR SURFACE WAVE TRANSDUCERS Final Report, 2 Jan. 1973 - 31 Oct. 1974
Thomas H. Lewis 13 Nov. 1974 24 p refs
(Contract F19628-73-C-0151; AF Proj. 5635)
(AD-A006124; AFCRL-TR-74-0575) Avail: NTIS CSCL 13/8

A process to produce photomask masters used in the production of surface wave transducers was developed and is described. Masters were to be clear pattern in achrome field on 7-mil glass with nominal 1.2 micrometer line and space widths with uniform electrode spacing in both apodized and unapodized patterns. Equipment limitations, processing techniques, and materials evaluated are discussed. Production of chrome masters on 60-mil glass was established. Consistent production on 7-mil glass requires additional development. GRA

N75-30443# Purdue Univ., Lafayette, Ind.
CONDUCTION MECHANISMS IN THICK FILM MICROCIRCUITS Semiannual Technical Report, 1 Jul. - 31 Dec. 1974
R. W. Vest 31 Dec. 1974 33 p refs
(Grant DAHC15-73-G8; ARPA Order 1001)
(AD-A008862) Avail: NTIS CSCL 09/5

The sintering kinetics and the ripening kinetics for RuO_2 particles in the presence of a glass phase were studied by measuring surface area, X-ray line broadening, shrinkage, and electrical resistance. Results from these four techniques are

interpreted in terms of competing processes which occur during thick film resistor firing. The sheet resistance of thick film resistors as a function of RuO_2/glass ratios is reported. GRA

N75-30444# Air Force Weapons Lab., Kirtland AFB, N.Mex.
A MODEL FOR THE DISCHARGE OF RADIATION-INDUCED SPACE CHARGE IN MOSFET'S Final Report, Jul. 1971 - Aug. 1974
R. J. Maier Feb. 1975 17 p refs
(DNA Proj. NWED-TB-027; AF Proj. 5710)
(AD-A008855; AFWL-TR-74-266) Avail: NTIS CSCL 20/12

Rapid annealing of the positive space charge in irradiated Si-SiO_2 metal systems is due to Quantum mechanical tunneling of electrons from the valance band to the trapped hole. The annealing factor increases and the total effect is reduced at all times by lower temperature processing or any technique which concentrates the traps near the interfaces. GRA

N75-30445# Spectra Mat, Watsonville, Calif.
HIGH CURRENT DENSITY CATHODES Semiannual Report, 1 Jul. - 31 Dec. 1974
G. Thornber Apr. 1974 20 p refs
(Contract DAAB07-73-C-0262; DA Proj. 1S7-62705-A-055)
(AD-A009114; ECOM-0262-1-73; SAR-1) Avail: NTIS CSCL 09/1

The objective of the program is to develop the expertise necessary to produce barium strontium tungstate cathodes with high levels of emission and of different physical configuration. The procedures and equipment used are described together with the progress to date. An emission level of 16 Amps./ sq cm has been obtained at 1050C but cannot yet be consistently reproduced. GRA

N75-30446# Westinghouse Electric Corp., Cheswick, Pa. Electro-Mechanical Div.
DESIGN AND DEVELOPMENT OF A SEGMENTED MAGNET HOMOPOLAR TORQUE CONVERTER Semiannual Technical Report
C. J. Mole, F. G. Arcella, E. Berkey, D. J. Bodes, and V. B. Doshi Feb. 1975 75 p refs
(Contract DAHC15-72-C-0229)
(AD-A008843; EM-4648) Avail: NTIS CSCL 13/10

The program is for the research and development of a new mechanical power transmission concept: the segmented magnet homopolar torque converter. The purpose of this device is to convert unidirectional torque of constant speed (such as from a steam turbine prime mover) into variable speed output torque in either the forward or reverse directions. The concept offers an efficient, lightweight low volume design with potential application over a wide range of speeds and power ratings in the range from hundreds to tens of thousands of horsepower. This machine concept can be applied to commercial and military advanced concept vehicles for both terrain and marine environments. The program places particular emphasis on the technology of liquid metal current collection systems for the reason this is essential for the success of the homopolar machine concept. GRA

N75-30447# Aerospace Corp., El Segundo, Calif. Engineering Science Operations.
RELIABILITY OF INTERCONNECTIONS ON MICROCIRCUITS Interim Report
D. L. Fresh 16 Dec. 1974 9 p
(Contract F04701-74-C-0075)
(AD-A008800; TR-0075(5901-02)-4; SAMSO-TR-75-92) Avail: NTIS CSCL 09/5

Defects in metal interconnection patterns constitute a significant factor in the reliability of semiconductor microcircuits. Electrical opens, occurring in the vacuum-deposited metal films, have achieved considerable notoriety and have been the basis for reliability studies by numerous investigators. The application of the scanning electron microscope (SEM) is becoming relatively widespread in detecting these defects in metallization. Considerable work has recently been directed toward improving the SEM procedures and techniques, including the preparation of a test method in MIL-STD format. The current status of the SEM test method; its utility, suitability, and acceptance in detecting defects in metal interconnection patterns; and its extension and applicability to other types of defects in high reliability semiconductor microcircuits are discussed. GRA

N75-30448# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FINDING CLOSED PARTITIONS FOR STATE ASSIGNMENTS IN SUBSET-SPECIFIED SEQUENTIAL MACHINES M.S. Thesis
Dennis Egan Dec. 1974 85 p refs
(AD-A008665; GE/EE/74-72) Avail: NTIS CSCL 09/5

Purnhagen has developed a method of state reduction for Subset-Specified Sequential Machines (SSSMs). Flowtable entries for these machines may be conditional Don't-Cares. An SSSM can select from any of the allowed next-state/output pairs in an entry upon each transition to that entry. Incompletely specified and completely specified machines are special cases of SSSMs. When state-reduced an incompletely specified machine may also contain optional entries. A method of computing closed partitions for completely specified and incompletely specified machines is developed. The method uses transitivity properties of the machines, and uses step tables to record the building of closed partition blocks. The method is applied to SSSMs and allows selection from the optional entries so as to maximize closed partitions in the machines. This selection process reduces the SSSM to an incompletely specified or to a completely specified machine, and state assignment can be completed using existing techniques. GRA

N75-30449# LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
POWER CONTROLLER BREADBOARD AND DEVELOPMENT REQUIREMENTS Final Report, 3 Dec. 1973 - 3 Jan. 1975
J. R. Perkins, A. J. Marek, and W. T. Turnage Jan. 1975 176 p refs
(Contract N62269-74-C-0151)
(AD-A008595; Rept-2-57110/4R-3195) Avail: NTIS CSCL 09/3

The study was conducted to resolve some of the problem areas associated with the development of solid state power controllers to the requirements of MIL-P-81653, and to establish design concepts and requirements which will lead to the development of low cost and reliable controllers. This report contains rationale for establishing design requirements, and presents design concepts for meeting the established requirements. Three solid state power controllers were designed, fabricated and tested. These are rated for 5.0 amperes at 28 volts dc, 2.0 amperes at 115 volts ac and 2.0 amperes at 28 volts dc or 115 volts ac. Recommended changes in design requirements for production ac and dc controllers are presented in the form of detail specification sheets. GRA

N75-30450# Consultec, Inc., San Diego, Calif.
VLF ANTENNA BASE INSULATOR MODEL TESTS Final Report
23 Mar. 1975 66 p
(Contract N00123-73-D-1077)
(AD-A008592) Avail: NTIS CSCL 09/5

The report summarizes an investigation of alternate base insulator designs for VLF transmitting antenna towers. The investigation encompassed three principal tasks: measure the voltage distribution and capacitance of three candidate insulator designs under conditions which simulate the Lualualei, Hawaii and Annapolis, Maryland transmitting sites; modify the three candidate designs by changing the configuration of corona shields and/or rain shields to attain an equal voltage distribution across multisection insulators; and modify one or more designs for optimum rain protection, under the prevailing environmental conditions at the Lualualei site. GRA

N75-30451# Harris Corp., Melbourne, Fla. Electronic Systems Div.
SOLID STATE TRANSPORTABLE TERMINAL Final Technical Report
22 Oct. 1973 60 p
(Contract DAAB07-72-C-0097)
(AD-A008668) Avail: NTIS CSCL 09/5

Data are presented on the acceptance testing of 700MHz/X-

band and 70MHz/X-band up converters and of X-band/700MHz and X-band/70MHz down converters. GRA

N75-30452# General Dynamics/Fort Worth, Tex.
CHEMICALLY INDUCED FIRES IN AIRCRAFT ELECTRICAL CIRCUITRY BY GLYCOL/WATER SOLUTIONS. HAZARD ANALYSIS AND ELIMINATION METHODS Final Engineering Report, 28 Jun. 1974 - 17 Jan. 1975
H. Douglas Stevens 29 Jan. 1975 63 p refs
(Contract F04606-74-C-00063)
(AD-A008896; FZM-6345) Avail: NTIS CSCL 13/12

As a result of airplane electrical connector fires traced to the presence of glycols, investigations have been undertaken to identify the mechanism of the involved hazards and to find methods of counteracting the hazards. Tests were performed with ethylene glycol, propylene glycol, and airplane deicing fluid as electrolytes in a wide range of dilution with water. Silver coated wire, gold coated connector pins, and rhodium coated connector pins were used as electrodes. Electrode spacings were determined which would produce the characteristic smoke and flames when 28 volts direct current was applied to the electrodes and the electrolyte was applied a drop at a time. The report details the tests performed, the variables conducive to a fire hazard and the procedures for reducing the hazard. GRA

N75-30453# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND PERFORMANCE OF A CCD MEMORY SYSTEM M.S. Thesis
Thomas C. Margraff Dec. 1974 78 p refs
(AD-A008657; GE/EE/74-56) Avail: NTIS CSCL 09/1

Three charge-coupled devices, the Fairchild 9216, the Fairchild LARAM, and the Bell Northern CC8M01 are analyzed to determine their suitability as compenents in a memory system. After comparing access time, configuration flexibility, and power consumption, the LARAM is chosen as the primary storage component for the mass memory unit. A memory system whose primary purpose is to test the operation of the CCD's is designed. The system has a capacity of up to ten LARAM devices. Various refresh interval periods and two operating frequencies, 5 MHz for refresh and 1.25 MHz for read/write operations are provided. Operational control of the system is provided through the console of the Hewlett Packard 9820A programmable calculator. To facilitate testing, the calculator provides a record of all address locations and data words used. GRA

N75-30454# Harry Diamond Labs., Washington, D.C.
FLUIDIC SIGNAL GENERATOR WITH INDEPENDENT BIAS PRESSURE CONTROL
George Mon Dec. 1974 11 p
(DA Proj. 1T1-61102-A-33B)
(AD-A009056; HDL-TR-1686) Avail: NTIS CSCL 09/5

A fluidic signal generator with independent bias pressure control has been built and tested. This signal generator used a dc torque motor-flapper valve assembly to effect a differential pressure output and a vacuum (aspirator) or a positive pressure source, to control the bias pressure level. The analytical prediction and the test results indicate that this signal generator can produce an ac pressure signal that rides on either a positive or negative bias pressure. Author (GRA)

N75-30455# California Univ., Santa Barbara. Computer Systems Lab.
RESEARCH IN MICROTERMINAL DEVELOPMENT AND NETWORK END-TO-END ERROR RECOVERY Quarterly Technical Report, 1 Jan. - 31 Mar. 1975
Roland F. Bryan, Paul E. Wells, and John H. McAfee 22 Apr. 1975 25 p refs
(Grant MDA903-75-G-2; ARPA Order 2852)
(AD-A009109; CSL-50; QTR-2) Avail: NTIS CSCL 09/2

In Task 1 (microterminal) the authors have pursued the implementation of a prototype terminal which will allow the direct replacement of new and more capable components as they become available. All prototype parts have been ordered except the housing and delivery of all parts should be complete by mid-April. A breadboard version is underway and the prototype is scheduled for completion before June. Task 2 (end-to-end) work for this quarter has been absorbed by implementing the hardware for the processor pair which will be responsible for communication and error recovery. One processor is ahead of the other in fabrication and will be used for software development as soon as it is completed. Design of the first transmission program is already underway using another network site. Author (GRA)

N75-30456# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
TUTORIAL DISCUSSION OF WAS (WEAKLY ADDITIVE SYSTEMS)
R. Saeks and R. DeCarlo Sep. 1974 6 p refs Presented at Midwest Symp. on Circuits and Systems, 17th, Lawrence, Kans., 15-17 Sep. 1974
(Grant AF-AFOSR-2631-74)
(AD-A008982; AFOSR-75-0577TR) Avail: NTIS CSCL 09/5

A survey of some recent work in the area of weakly additive systems (WAS) is presented. Intuitively, these are the simplest class of nonlinear system originally termed (N sub 1) systems by Zadeh, and are characterized by time related behavior similar to linear systems. Although relatively simple in nature themselves many practical feedback systems have weakly additive open loop gain; hence the study of weakly additive systems is of potential significance. GRA

N75-30457# Florida Univ., Gainesville. Dept. of Engineering Science Mechanics and Aerospace Engineering.
MODULAR SYSTEMS THEORY, DESIGN AND ANALYSIS
William H. Boydkin 13 Dec. 1974 23 p refs
(Grant AF-AFOSR-2605-74; AF Proj. 9749)
(AD-A008976; AFOSR-75-0364TR) Avail: NTIS CSCL 09/1

This report is a brief summary of research accomplishments during the period 1 November 1973 through 31 October 1974 by the author and his associates in developing both theory and methodology for the design and analysis of modular systems. The report describes the literature reviewed, the current status of the research project, and the specific research tasks initiated or completed. In addition, a list of other publications is provided which describes the findings in more detail. GRA

N75-30458# Stanford Research Inst., Menlo Park, Calif.
ELECTROMAGNETIC-PULSE HANDBOOK FOR ELECTRIC POWER SYSTEMS Final Report, 15 Jun. 1973 - 15 Jun. 1974
Edward F. Vance 4 Feb. 1975 341 p
(Contract DNA001-73-C-0238; DNA Proj. NWED-QAXE)
(AD-A009228; DNA-3466F) Avail: NTIS CSCL 09/3

The handbook provides formulas and data for evaluating coupling of the high-altitude EMP to electric power systems and to facilities served with commercial electric power. The subjects covered include coupling to power transmission and distribution lines, transient coupling through transformers, lightning-arrester firing characteristics, and coupling through the service entrance. Grounding, EMP protective measures, and testing are also discussed. The emphasis of the handbook is on the EMP effects of concern to the power user, but much of the information contained in the handbook can also be used to evaluate the effects of the EMP on electric power systems. GRA

N75-30459# Hughes Aircraft Co., Culver City, Calif.
MAXIMUM DATA RATE LOGIC ARRAY DEVELOPMENT. VOLUME 2: APPENDICES Final Report, 10 Apr. 1972 - 10 Sep. 1973
James R. Gaskill, Jr., Lawrence R. Weill, James H. Flint, Edwin A. Kelley, and John W. Klinechock Jun. 1974 251 p refs
(Contract F33615-72-C-1462; AF Proj. 6096)
(AD-A008814; AFAL-TR-74-221) Avail: NTIS CSCL 09/5

A high-speed bipolar universal logic gate (ULG) integrated circuit family and its applications were investigated. Implemented with current or emerging processing technologies, ULGs can be used, particularly in LSI circuits, in lieu of conventional gate arrays to implement combinational networks having improved throughput rates, lower power dissipation, and reduced hardware cost. Appendices summarize information regarding circuit work that was performed in connection with this research including the equipment and procedures which were established and used to perform transistor-device parameter measurements. Detailed

analyses of the large-signal transient behavior of the current-switch, emitter-follower, and common-base-stage cascade component circuits are included. Each analysis develops a set of approximate relationships between device parameters, surrounding conditions in a larger circuit, and delay and rise-time behavior of the component circuit of interest. A concise mathematically correct development of selected properties of two's complement coding and a related series of examples illustrating their application are given. Author

N75-30460# Massachusetts Inst. of Tech., Cambridge.
SURFACE CONDUCTIVITY SHIELDING OF AIR GAP ELECTRIC FIELDS OF HIGH VOLTAGE ALTERNATORS Final Report
James L. Kirtley, Jr. 29 Apr. 1975 9 p
(Grant NSF GI-32723)
(PB-241275/7; NSF-74-45) Avail: NTIS HC $3.25 CSCL 10B

One of the advantages proposed for superconducting machines is the probability of generating electric power at very high voltage (possibly even at transmission line level). Accordingly, some of the efforts of the superconducting machine group was devoted toward developing techniques for designing high voltage armatures. The concepts developed were limited to voltage gradient windings, toroidal winding geometry, and segmented cores. All of these developments have served to reduce the internal insulation requirements for the armature of an alternator. GRA

N75-30461# National Bureau of Standards, Washington, D.C.
HAZARD ASSESSMENT OF ALUMINUM ELECTRICAL WIRING IN RESIDENTIAL USE
Elaine D. Bunten, John L. Donaldson, and Eugene C. McDowell Dec. 1974 59 p refs Sponsored in part by Consumer Prod. Safety Comm., Washington, D. C.
(COM-75-10516/3; NBSIR-75-677) Avail: NTIS HC $4.25 CSCL 09A

The history of the use of aluminum in residential wiring is reviewed and the characteristics essential to data to be used to evaluate the performance of aluminum wiring in the field, are described. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N75-30462 British Library Lending Div., Boston Spa (England).
A STUDY OF HEAT TRANSFER TO BOILING FREON 11 AND 12 UNDER DIFFERENT CONDITIONS OF CENTRIFUGAL ACCELERATIONS
S. N. Fainzilberg and V. I. Usenko [1974] 9 p refs Transl. into ENGLISH from Kholod Tekh. (Moscow), v. 5, 1973 p 47-49
(BLL-M-23664-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

Experimental heat transfer coefficients measured for boiling Freon 11 and 12 from 1g to 5000g are reported. Heat transfer was calculated as a function of the heated surface. Author

N75-30463 British Library Lending Div., Boston Spa (England).
RESEARCH INTO RADIANT HEAT TRANSFER IN A CONICAL SHAPED CHAMBER CONTAINING AN ABSORBENT MEDIUM
Yu. A. Surinov and V. E. Fedyanin 1974 11 p Transl. into ENGLISH from Izvest VUZ (Moscow), v. 9, 1974 p 150-153
(BLL-M-25076-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 2 BLL photocopy coupons

The use is described of the generalized zonal method proposed for the numerical investigation and calculation of the local and meaned characteristics of radiant heat transfer in a conical chamber filled with an isothermal absorbent medium. The mixed setting of the problem is considered. For comparison purposes, the results are given of calculating the characteristics of radiant heat transfer in a conical chamber in the presence of a diathermal medium. Author

N75-30464+ Societe Bertin et Cie, Plaisir (France).
COMPUTATION PROGRAM FOR THREE-DIMENSIONAL INCOMPRESSIBLE FLOW Final Report [REALISATION D'UN PROGRAMME DE CALCUL D'ECOULEMENTS TRIDIMENSIONNELS DE FLUIDES INCOMPRESSIBLES]
R. Virefleau 12 Jun. 1974 155 p refs In FRENCH
(Contract DGRST-72-7-0724)
(Rept-74-Cb-06) Avail: NTIS HC $6.25

A computer program for three-dimensional incompressible flow in subsonic regime is presented. The physical model retained is described with regard to boundary conditions and turbulence, and the corresponding mathematical model is detailed. The numerical realization by finite difference method is discussed together with the general algorithm and its convergence. Four examples are worked out in full. ESRO

N75-30465*# Stanford Univ., Calif. Thermosciences Div.
COMPUTATION OF TURBULENT FLOWS
W. C. Reynolds May 1975 43 p refs
(Grant NGR-05-020-622)
(NASA-CR-143323; SU-TF-4) Avail: NTIS HC $3.75 CSCL 20D

Substantial advances made over the past decade in the prediction of turbulent flows are discussed. There was extensive work in the development of turbulence models, particularly for use in boundary layer calculations. Basic aspects of several important methods based on partial differential equations for the mean velocity field and turbulence quantities, including the relationship between the methods and suggestions for future development were reviewed. Work on three-dimensional time-dependent large eddy simulations is discussed. The emphasis is on the hydrodynamics of incompressible flows, but sources for consideration of heat transfer and compressibility are mentioned. Author

N75-30466# Victoria Univ. (British Columbia).
PHOTOGRAMMETRY OF THE SHOCK FRONT TRAJECTORIES ON DIPOLE WEST SHOTS 8, 9, 10 AND 11
J. M. Dewey, D. Classen, and D. McMillin Jul. 1975 188 p refs
(UVIC-PF-1-75) Avail: NTIS HC $7.00

The photogrammetry of shock waves produced by the simultaneous detonation of two spherical 1080 lb Pentolite charges is presented. Four experiments were carried out. For each charge configuration, one experiment was carried out over smooth ground and another over rough ground. In each experiment photogrammetrical measurements were made of the trajectories of the primary spherical shock from the bottom charge; of the Mach stem shock along the ground surface, and of the Mach stem shock produced along the ideal reflecting plane between the two charges. Results of comparisons of the shock strengths of the Mach stems along the ground and close to the ideal reflecting plane, indicate an energy loss in the shock front of approximately 10% over the smooth ground and of approximately 40% over the rough ground. Author

N75-30467*# University of Southern Calif., Los Angeles. Dept. of Aerospace Engineering.
ON UPSTREAM BLOCKING IN A VISCOUS DIFFUSIVE STRATIFIED FLOW
C. G. Koop and L. G. Redekopp [1975] 18 p refs
(Grant NGR-05-018-178)
(NASA-CR-143338) Avail: NTIS HC $3.25 CSCL 20D

The effect of diffusion of specie upon the flow about a transverse flat plate moving horizontally in a viscous stratified medium is considered. Asymptotic expansions are used to define a parameter regime where a viscous-diffusive-buoyancy balance is dominant. The solution, expressed in terms of an inverse Fourier transform, is numerically integrated. The results show that, as in the non-diffusive problem, a region of closed streamlines exists ahead of the body. However, unlike the case where diffusion is neglected, the density field within this recirculating region is uniquely determined and found to be statically stable. It is also found that varying the relative amount of diffusion affects not

only the density distribution, but the velocity profile as well, indicating a strong coupling between the vorticity and specie equation. Author

N75-30468*# Texas Univ., Austin. Dept. of Aerospace Engineering and Engineering Mechanics.
CHARACTERIZATION OF TYPICAL PLATELET INJECTOR FLOW CONFIGURATIONS
Charles E. Hickox Aug. 1975 162 p refs
(Contract NAS9-13865)
(NASA-CR-144391; Rept-75006) Avail: NTIS HC $6.25 CSCL 20D

A study to investigate the hydraulic atomization characteristics of several novel injector designs for use in liquid propellant rocket engines is presented. The injectors were manufactured from a series of thin stainless steel platelets through which orifices were very accurately formed by a photoetching process. These individual platelets were stacked together and the orifices aligned so as to produce flow passages of prescribed geometry. After alignment, the platelets were bonded into a single, 'platelet injector', unit by a diffusion bonding process. Because of the complex nature of the flow associated with platelet injectors, it was necessary to use experimental techniques, exclusively, throughout the study. Large scale models of the injectors were constructed from aluminum plates and the appropriate fluids were modeled using a glycerol-water solution. Stop-action photographs of test configurations, using spark-shadowgraph or stroboscopic back-lighting, are shown. Author

N75-30469*# Old Dominion Univ. Research Foundation, Norfolk, Va. School of Engineering.
EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF 0 G CONDENSATION IN A MECHANICAL REFRIGERATION SYSTEM APPLICATION
Edward G. Keshock May 1975 103 p refs
(Contract NAS9-13410)
(NASA-CR-144400; TR-75-T6) Avail: NTIS HC $5.25 CSCL 20D

Basic equations of momentum and energy are presented and discussed with respect to heat transfer and pressure drop for forced flow condensation in horizontal tubes under 1-g and 0-g conditions. Some experimental results are presented for condensing refrigerant-12 in a system of three parallel-connected quartz tubes (3-mm inside diameter, G = 1.037 to 3.456 x 105 lbm/hr-sq. ft). From high speed photographs, measurements were obtained of film thickness, phase velocities, disturbance wavelengths, and flow regimes and their transitions. Based upon these measurements various dimensionless force ratios (flow and instability parameters) were calculated. Under 0-g conditions a uniformly thick redistribution of liquid condensate about the tube walls was found to result in a lowered heat transfer coefficient as compared with 1-g conditions, based upon fundamental heat transfer theory. A model is proposed that takes into account the difference in heat transfer due to condensate distribution under 1-g and 0-g conditions. Author

N75-30470*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Aerospace and Ocean Engineering Dept.
COMPUTER USER'S GUIDE FOR A CHEMICALLY REACTING VISCOUS SHOCK-LAYER PROGRAM
E. W. Miner and Clark H. Lewis Washington NASA May 1975 186 p
(Contract NAS9-12630)
(NASA-CR-2551) Avail: NTIS HC $7.00 CSCL 20D

A description is given of the computer code for predicting viscous shock-layer flows over nonanalytic blunt bodies (Program VISLNABB) for hypersonic, low Reynolds number flows. Four specific and one general body geometries are considered. In addition to sphere-cones, cylinder wedges and geometries defined in tabular form, options for hyperboloids and paraboloids are included. Details of the theory and results are included in a separate engineering report. The program, subroutines, variables in common, and input and output data are described. Listings of the program code, output data for a sample case, and the input data for this sample case are included. Author

N75-30471# Advisory Group for Aerospace Research and Development, Paris (France).
MODERN METHODS OF TESTING ROTATING COMPONENTS OF TURBOMACHINES (INSTRUMENTATION)
M. Pianko, ed. (ONERA) Apr. 1975 186 p refs
(AGARD-AG-207; AGARDograph-207) Avail: NTIS HC $7.00

Various flow measuring techniques used in turbomachinery and cascade wind tunnels are reviewed. Flow visualization, laser anemometry, and pressure sensors are among the methods discussed. For individual titles, see N75-30472 through N75-30475.

N75-30472 Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
AERODYNAMIC MEASUREMENTS IN CASCADES
M. C. Sieverding, H. Starken (DFVLR), H. J. Lichtfuss, and P. Schimming *In* AGARD Modern Methods of Testing Rotating Components of Turbomachines (Instrumentation) Apr. 1975 p 1-76 refs (For availability see N75-30471 21-34)

The usefulness of cascade flow measurements used to acquire detailed blade performance data is discussed. The design of a cascade wind tunnel is described. Factors considered include: two dimensional and periodic flow, variations of inlet and outlet conditions, and three dimensional effects. Data reduction methods are presented along with factors which influence the choice of appropriate pressure probes. J.M.S.

N75-30473 Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
AERODYNAMIC MEASUREMENTS IN TURBOMACHINES
David W. Fleeger and Noel J. Seyb (Rolls-Royce, Ltd., Bristol, Engl.) *In* AGARD Modern Methods of Testing Rotating Components of Turbomachines (Instrumentation) Apr. 1975 p 79-121 refs (For availability see N75-30471 21-34)

The problems encountered in designing instrumentation for component and engine testing are discussed. Trade-offs must be made between probe strength, blockage, accuracy, cost, and installation problems. Many of the basic parameters often measured are summarized in tabular form listing typical methods and citing references. Conventional techniques concerning pressure (steady state and high response) and gas temperature measurement are discussed in detail. Methods to couple the use of both steady state and high pressure transducers involve the flush mounted diaphram, resonant tube, resonant damped and non-resonant tube methods. Special considerations are required to measure the time weighted value of a high frequency pressure signal. For thermocouple design many factors including wire type, recovery, convection, conduction, radiation, chemical reactions, and time response are considered. Calibration techniques are discussed for both pressure probes and thermocouples. Typical probe designs with calibration data which were provided by engine manufacturers are compared. Author

N75-30474 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
OPTICAL MEASUREMENTS IN TURBOMACHINERY
Jacques Paulon *In* AGARD Modern Methods of Testing Rotating Components of Turbomachines (Instrumentation) Apr. 1975 p 123-139 refs (For availability see N75-30471 21-34)

Flow visualization and optical measurement techniques used to determine the structure of the flow and measure local values of velocity, pressure, or temperature in turbomachinery without introducing any material probe are reviewed. Methods discussed include: visualization by means of smoke filaments, hydraulic models, shadow and schlieren techniques, holography techniques, laser anemometry, laser dual beam method, and Raman scattering. The optical measurement techniques allow, in the rotor as well as the stator, the determination of the mean and time-dependent characteristics of the flow field without any disturbance. J.M.S.

N75-30475 Advisory Group for Aerospace Research and Development, Paris (France).
UNSTEADY FLOW MEASUREMENTS IN TURBOMACHINERY
H. Weyer and R. Schodl *In its* Modern Methods of Testing Rotating Components of Turbomachines (Instrumentation) Apr. 1975 p 141-182 refs (For availability see N75-30471 21-34)

Determination of strong pressure oscillations of high frequency and high amplitudes which occur in the region of turbomachine rotors is considered in terms of immediate measuring of the

fluctuating pressures at the casing in the rotor zone, as well as behind the rotor exit plane, and determination of the average pressures resulting from these oscillating pressures. The application of the modern high response pressure transducers and of new techniques, which enable the measurement of well defined average values of the oscillating pressures in turbomachines are described along with a method for instantaneous flow angle measurement in centrifugal compressors. Emphasis is placed on the development of a laser dual beam technique for flow velocity measurements in turbomachines. Author

N75-30476*# Stanford Univ., Calif. Dept. of Mechanical Engineering.
NUMERICAL SIMULATION OF TURBULENCE IN THE PRESENCE OF SHEAR
S. Shaanan, J. H. Ferziger, and W. C. Reynolds Aug. 1975 140 p refs
(Grant NGR-05-020-622)
(NASA-CR-143349; SU-TF-6) Avail: NTIS HC $5.75 CSCL 20D

The numerical calculations are presented of the large eddy structure of turbulent flows, by use of the averaged Navier-Stokes equations, where averages are taken over spatial regions small compared to the size of the computational grid. The subgrid components of motion are modeled by a local eddy-viscosity model. A new finite-difference scheme is proposed to represent the nonlinear average advective term which has fourth-order accuracy. This scheme exhibits several advantages over existing schemes with regard to the following: (1) the scheme is compact as it extends only one point away in each direction from the point to which it is applied; (2) it gives better resolution for high wave-number waves in the solution of Poisson equation, and (3) it reduces programming complexity and computation time. Examples worked out in detail are the decay of isotropic turbulence, homogeneous turbulent shear flow, and homogeneous turbulent shear flow with system rotation. Author

N75-30477*# Stanford Univ., Calif. Thermosciences Div.
THREE-DIMENSIONAL TIME DEPENDENT COMPUTATION OF TURBULENT FLOW
D. Kwak, W. C. Reynolds, and J. H. Ferziger May 1975 134 p refs
(Grant NGR-05-020-622)
(NASA-CR-143347; SU-TF-5) Avail: NTIS HC $5.75 CSCL 20D

The three-dimensional, primitive equations of motion are solved numerically for the case of isotropic box turbulence and the distortion of homogeneous turbulence by irrotational plane strain at large Reynolds numbers. A Gaussian filter is applied to governing equations to define the large scale field. This gives rise to additional second order computed scale stresses (Leonard stresses). The residual stresses are simulated through an eddy viscosity. Uniform grids are used, with a fourth order differencing scheme in space and a second order Adams-Bashforth predictor for explicit time stepping. The results are compared to the experiments and statistical information extracted from the computer generated data. Author

N75-30478*# Kanner (Leo) Associates, Redwood City, Calif.
EXPERIMENTAL INVESTIGATION OF THE COEFFICIENT OF FRICTION IN THE TURBULENT FLOW OF AN INCOMPRESSIBLE FLUID IN THE PRESENCE OF AN UNDULATED WALL
C. Cancelli and F. Vatta Washington NASA Aug. 1975 25 p refs Transl. into ENGLISH of "Indagine Sperimentale sul Coefficiente di Attrito di una Corrente Turbolenta di un Fluido Incompressible in Presenza di Ondulosita di Parete", Rept. Memorie No. 20 Accademia della Scienze, Classe di Scienze Fisiche, Matematichee Naturali, Italy, 1974 p 1-20
(Contract NASw-2790)
(NASA-TT-F-16525; No-20) Avail: NTIS HC $3.25 CSCL 20D

The behavior of the coefficient of friction of an incompressible fluid flowing in a channel having undulated walls is experimentally studied. The effect of the undulation geometry is examined and comparisons are made to the plane-wall case. An analysis is made of fluid separation from the wall and of pressure fluctuations along the channel axis. Author

N75-30479*# General Dynamics/Convair, San Diego, Calif.
CENTAUR PROPELLANT ACQUISITION SYSTEM STUDY Final Report, 9 Jan. 1974 - 25 May 1975
M. H. Blatt and M. D. Walter Jun. 1975 200 p refs
(Contract NAS3-17802)
(NASA-CR-134811; CASD-NAS-75-023) Avail: NTIS HC $7.00 CSCL 20D

A study was performed to determine the desirability of replacing the hydrogen peroxide settling system on the Centaur D-1S with a capillary acquisition system. A comprehensive screening was performed to select the most promising capillary device fluid acquisition, thermal conditioning, and fabrication techniques. Refillable start baskets and bypass feed start tanks were selected for detailed design. Critical analysis areas were settling and refilling, start sequence development with an initially dry boost pump, and cooling the fluid delivered to the boost pump in order to provide necessary net position suction head (NPSH). Design drawings were prepared for the start basket and start tank concepts for both LO2 and LH2 tanks. System comparisons indicated that the start baskets using wicking for thermal conditioning, and thermal subcooling for boost pump NPSH, are the most desirable systems for future development. Author

N75-30480*# Wisconsin Univ., Madison. Space Science and Engineering Center.
HONEYCOMB THERMAL SHIELD STUDY Final Report
R. M. Dombroski 7 Feb. 1975 54 p refs
(Contract NAS5-20068)
(NASA-CR-144671) Avail: NTIS HC $4.25 CSCL 20M

A honeycomb thermal shield is described which is an economical and reliable alternative to existing thermal shielding methods for reducing the radiated heat loss from elements which will not allow obstructions in the field of view. The device is simply open-face honeycomb of the type used throughout the aerospace industry for structural panels. The honeycomb thermal shield uses only the core of the honeycomb panel, so it has little structural stiffness and is transparent through the cells. It is located in close proximity to, but conductively decoupled from, the element to be shielded (the radiative source) with the axis of the honeycomb cells parallel to the view direction of the source. The source radiates into a 2pi steradian field occupied by the shield. The view field will be transparent along the axis of the honeycomb but will be increasingly obscured as the off-normal view angle increases. The angular dependence is a function of the cell height to width ratio. Author

N75-30481*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
SUPERSONIC TURBULENT BOUNDARY-LAYER FLOWS WITH MASS INJECTION THROUGH SLOTS AND/OR POROUS WALLS Final Report
Alvin L. Murray and Clark H. Lewis Washington NASA Sep. 1975 84 p refs
(Grant NGR-47-004-106)
(NASA-CR-2587) Avail: NTIS HC $4.75 CSCL 20D

An implicit finite-difference method was used to solve the compressible boundary-layer equations, and to study the effects of mass transfer through porous plates, slots, and a combination of the two. The effects of the external pressure field were also included by using a global pressure interaction scheme. Two different eddy viscosity models were used for the slot and slot-porous combination cases: one was a two-layer model with inner and outer laws, and the other was a multi-layer model with as many as five separte layers. Results of the present method were compared with experimental data at a Mach number of 2.8. Comparisons of the skin friction reduction and Mach number profiles gave good to excellent agreement. Pressure interaction had little effect on the slot injection skin friction but increased the skin friction of the porous and slot-porous combination markedly. Author

N75-30482*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A METHOD FOR CALCULATING A REAL-GAS TWO-DIMENSIONAL NOZZLE CONTOUR INCLUDING THE EFFECTS OF GAMMA
Charles B. Johnson and Lillian R. Boney Washington Sep.

1975 40 p refs
(NASA-TM-X-3243; L-10144) Avail: NTIS HC $3.75 CSCL 20D

A method for calculating two-dimensional inviscid nozzle contours for a real gas or an ideal gas by the method of characteristics is described. The method consists of a modification of an existing nozzle computer program. The ideal-gas nozzle contour can be calculated for any constant value of gamma. Two methods of calculating the center-line boundary values of the Mach number in the throat region are also presented. The use of these three methods of calculating the center-line Mach number distribution in the throat region can change the distance from the throat to the inflection point by a factor of 2.5. A user's guide is presented for input to the computer program for both the two-dimensional and axisymmetric nozzle contours. Author

N75-30483*# TRW Systems Group, Redondo Beach, Calif.
THERMAL NETWORK MODELLING HANDBOOK
Jan. 1972 92 p refs
(Contract NAS9-10435)
(NASA-CR-144418; TRW-14690-H003-RO-00) Avail: NTIS HC $4.75 CSCL 20M

Thermal mathematical modelling is discussed in detail. A three-fold purpose was established: (1) to acquaint the new user with the terminology and concepts used in thermal mathematical modelling, (2) to present the more experienced and occasional user with quick formulas and methods for solving everyday problems, coupled with study cases which lend insight into the relationships that exist among the various solution techniques and parameters, and (3) to begin to catalog in an orderly fashion the common formulas which may be applied to automated conversational language techniques. Author

N75-30484# Council for Scientific and Industrial Research, Pretoria (South Africa).
THE INFLUENCE OF POROSITY AND GRAIN SIZE DISTRIBUTION ON THE PERMEABILITY EQUATION OF POROUS FLOW
H. Rumpf and A. R. Gupte 1975 33 p refs Transl. into ENGLISH from Chemie Ing. Techn. (Weinheim), v. 43, no. 6, p 367-375
(CSIR-Trans-1208) Avail: NTIS HC $3.75

A dimensional analysis approach was developed which takes packing structure into account. The dependence of the permeability on the porosity was measured using uniform packings of spherical particles. Based on a regression analysis of the measurements, the permeability could be represented as a function of the porosity in the form of a power function. The second function given is preferred since it is sufficiently accurate even in the fluidized bed region, and yields a physically significant result on proceeding to the limit epsilion approaching 1. The width as well as the shape of the grain size distribution curve was found to have a significant effect on the permeability, specific surface area and porosity being constant. Author

N75-30485# Martin Marietta Labs., Baltimore, Md.
THREE-DIMENSIONAL LAMINAR BOUNDARY LAYER OVER BODY OF REVOLUTION AT INCIDENCE. PART 8: THE CASE OF LOW INCIDENCE INVOLVING CIRCUMFERENTIAL-FLOW REVERSAL Interim Report
K. C. Wang Oct. 1974 57 p refs
(Contract F44620-70-C-0085; AF Proj. 9749)
(AD-A005696; MML-TR-74-14C-Pt-8; AFOSR-75-0261TR-Pt-8) Avail: NTIS CSCL 20/4

This work concerns an investigation of three-dimensional laminar boundary layer over a blunt body (prolate spheroid) at low incidence and with reversed flow. Results reflecting the general characteristics of such a problem are presented. More significant are the features relating to the circumferential-flow reversal. GRA

N75-30486# Rutgers Univ., New Brunswick, N.J. Dept. of Mechanical and Aerospace Engineering.
A FLOW VISUALIZATION STUDY OF A RESONANCE TUBE Technical Report, 1 Jul. 1973 - 1 Jul. 1974
C. E. G. Przirembel and L. S. Fletcher Jul. 1974 46 p refs
(Contract DAAA21-73-C-0781)
(AD-A006225; RU-TR-144-MIAE-F) Avail: NTIS CSCL 20/4

A photographic study of the flow field associated with a two-dimensional resonance tube was conducted. Both start-up and steady-state flows were investigated. The test gas was compressed air. The test parameters, varied during the preliminary experimental program, were the nozzle jet stagnation pressure (PO), the ratio of the separation distance between the nozzle and the resonance tube to the nozzle height (S/D), and the ratio of the resonance tube length to the nozzle height (L/D). GRA

N75-30487# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERACTION OF PLANE WAVE WITH THE PUNCHED WALL
M. P. Ryabokon 26 Feb. 1975 14 p Transl. into ENGLISH from Tsentr. Aerogidrodinamicheskii Inst. Uch. Zap. (USSR), v. 3, no. 2, 1972 p 140-141
(AD-A008765; FTD-MT-24-0415-75) Avail: NTIS CSCL 20/4

The interaction of plane wave in supersonic flow with a punched wall was investigated. Expressions were obtained for the relative intensity of reflected wave, and the condition of the absence of reflection from the punched wall. The linear approximation method was used. M.J.S.

N75-30488# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VISCOUS FLUID FLOW ON THE RIPPLED SURFACE OF THE SLIDING WING
V. A. Barinov and A. V. Zubtsov 26 Feb. 1975 25 p refs Transl. into ENGLISH from Tsentr. Aerogidrodinamicheskii Inst. Uch. Zap. (USSR), v. 1, no. 6, 1970 p 75-81
(AD-A008764; FTD-MT-24-0374-75) Avail: NTIS CSCL 20/4

The effect of the undulation of surface of an ideal flow around a wing was studied. A numerical calculation of a three dimensional boundary layer of the wing is shown. The distribution of heat fluxes on the wing is treated. Surface undulation is shown to cause a change in flow characteristics. J.R.T.

N75-30489# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF THE EFFECT OF JET FLOW ON POROUS SURFACE
V. I. Garkusha 26 Feb. 1975 11 p refs Transl. into ENGLISH from Tsentr. Aerogidrodinamicheskii Inst. Uch. Zap. (USSR), v. 3, no. 3, 1972 p 127-128
(AD-A008762; FTD-MT-24-0336-75) Avail: NTIS CSCL 20/4

Results of the calculation of pressure field within the porous media are compared with the available experimental data. Numerical analyses are included. M.J.S.

N75-30490# Air Force Academy, Colo. Frank J. Seiler Research Lab.
AN EXPERIMENTAL INVESTIGATION OF THE FLOW IN AN INTERSTAGE CONNECTING DUCT FOR USE ON A HIGH POWER GASDYNAMIC LASER. 2: MASS SPECTROMETER AND PRESSURE MEASUREMENTS Final Report
Robert A. Golobic Mar. 1975 25 p refs
(AF Proj. 7905)
(AD-A008774; SRL-TR-75-0006) Avail: NTIS

A model of a duct used to optically connect to high-power gasdynamic lasers was tested employing the USAF Academy trisonic wind tunnel. The wind tunnel was used as the cold flow simulation of the laser operating at a Mach number of 4.38 and test section static pressures of 0.5 to 0.8 psia and a mock-up of one half of the laser duct was attached to the wind tunnel test section. Mass spectrometer analysis of the flow composition at two locations resulted in the determination of the power mass flow rate out of the duct necessary to keep it free of wind tunnel gas. Helium, nitrogen and argon were tested as purge gases. The similarity parameter used to relate the wind tunnel tests to the actual laser conditions was found to be dependent upon the type of purge gas. Shear-layer stability is thought to account for this discrepancy. Pressure measurements revealed no sharp disturbances during purging. GRA

N75-30491# Air Force Systems Command, Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF THE WALL EFFECT ON THE READINGS OF A HOT WIRE ANEMOMETER Foreign Technology Div.
V. S. Demin 5 Mar. 1975 14 p refs Transl. into ENGLISH from Izv. Sib. Otd. Akad. Nauk SSSR (USSR), no. 3, 1969 p 50-54
(FTD Proj. T74-601-35)
(AD-A008633; FTD-HT-23-1037-75) Avail: NTIS CSCL 14/2

The effects of heat conducting wall material on hot wire anemometer readings with a filament pickup were studied in laminar and turbulent boundary layer flows along steel or organic glass-nozzle walls. It was found that wedge pickups gave correct readings in boundary layer nozzle flows up to a distance of not more than 0.5 mm from the wall. G.G.

N75-30492# Air Force Systems Command, Wright-Patterson AFB, Ohio.
HYDRAULIC FRICTION AND THERMAL CONDUCTIVITY DURING THE FLOW OF GAS IN POROUS BODIES, WHICH IMITATE INTERNAL HEAT SOURCES Foreign Technology Div.
I. G. Saplin, E. I. Khelemelya, and V. N. Krymasov 20 Feb. 1975 20 p refs Transl. into ENGLISH from Uch. Zap. Tsagi (USSR), v. 3, no. 3, 1972 p 129-133
(AD-A008634; FTD-MT-24-0337-75) Avail: NTIS CSCL 20/4

Thermal conductivity and heat friction in porous bodies were experimentally investigated. It is shown that gas flow and heat exchange in porous metals are analogous to gas flow and heat exchange in dispersal media. Results are used to solve the problem of unsteady thermal conductivity in porous shells. - J.M.S.

N75-30493# Washington Univ., Seattle. Dept. of Aeronautics and Astronautics.
RESEARCH IN RESONANCE IN PARTIAL DIFFERENTIAL EQUATIONS Interim Report
Jirair Kevorkian 1975 7 p refs
(Grant AF-AFOSR-2452-73; AF Proj. 9749)
(AD-A006463; AFOSR-75-0377TR) Avail: NTIS CSCL 20/4

During the period covered in this report the principal investigator and collaborators have worked on the following three areas: (1) nonlinear acoustics, (2) nonlinear wave propagation, and (3) reentry roll resonance. GRA

N75-30494# Office of Naval Research, London (England).
CAVITATION RESEARCH IN PARIS: VIVE LA DIFFERENCE
Roger E. A. Arndt 3 Feb. 1975 17 p refs
(AD-A006028; ONRL-R-2-75) Avail: NTIS CSCL 20/4

Cavitation research at both the University of Paris and the Electricite de France is concentrated on the details of the bubble dynamics during growth and collapse. No work is done in the areas of partial and fully developed cavitation and the side effects of noise, vibration and performance degradation. The work being done is quite different, and perhaps complements the more classical efforts in cavitation research carried out at other facilities. GRA

N75-30495# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ARTICLE G. I. TAGANOVA. ABOUT THE SECOND DISPERSIVE BOUNDARY LAYER AND TRACE IN VISCOUS FLOW ABOUT BODY
V. Ya. Neiland 21 Feb. 1975 16 p refs Transl. into ENGLISH from Uch. Zap. Tsagi (USSR), v. 1, no. 6, 1970 p 45-48
(AD-A008637; FTD-MT-24-0372-75) Avail: NTIS CSCL 20/4

Viscous, compressible flow about a body is investigated with emphasis on the influence of Reynolds, boundary layer, and velocity field. An energy method of calculation of flow resistance is discussed along with the velocity field of the dispersive boundary layer. J.M.S.

N75-30496# Denver Research Inst., Colo. Div. of Mathematical Sciences.
INTERNAL GRAVITY WAVES GENERATED BY A MOVING SOURCE IN A STRATIFIED FLUID
Robert D. Mager Dec. 1974 93 p refs
(Contract AT(11-1)-2482; Grant AF-AFOSR-2306-72; AF Proj. 9749)
(AD-A008718; MS-R-7502; COO-2482-1; AFOSR-75-0361TR) Avail: NTIS CSCL 20/4

The internal gravity wave system generated by a moving dipole source located in a stratified fluid is investigated. The problem is solved via multi-dimensional Fourier analysis; an alternate approach, based on the ray method technique for hyperbolic partial differential equations, is presented, and the results shown to agree with the Fourier solution. The approach allows for a rather general shear flow profile; the Brunt-Vaisala frequency may also depend on depth. GRA

N75-30497# ARO, Inc., Arnold Air Force Station, Tenn.
A METHOD FOR COMPUTING BOUNDARY-LAYER FLOWS, INCLUDING NORMAL PRESSURE GRADIENT AND LONGITUDINAL CURVATURE EFFECTS Final Report, Sep. 1973 - Aug. 1974
Arloe W. Mayne, Jr. AEDC Apr. 1975 37 p refs
(ARO Proj. VF403; ARO Proj. V33P)
(AD-A008739; ARO-VFK-TR-74-114; AEDC-TR-75-21) Avail: NTIS CSCL 20/4

A method is presented for computing laminar and turbulent boundary-layer flows, including normal pressure gradient and longitudinal curvature as well as compressibility, transverse curvature, and other effects. The governing equations are transformed using the (omega squared) transformation to a von Mises form and solved using an implicit finite-difference scheme. The method is validated by comparing results with experimental data and results of other methods of computation. GRA

N75-30498# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LAMINAR BOUNDARY LAYER ON PLATE WITH THE BLOWING-IN OF GAS AT ACUTE ANGLE TO SURFACE
E. A. Stepanov 25 Feb. 1975 23 p refs Transl. into ENGLISH from Uch. Zap. Tsagi (USSR), v. 3, no. 3, 1972 p 116-121
(AD-A008630; FTD-MT-24-0334-75) Avail: NTIS CSCL 20/4

Results are presented of a numerical study of laminar boundary layer on a flat-plane plate, and correlation formulas are given for the calculation of the voltage/stress of friction and heat flux. Recommendations are included for the engineering estimates of yaw effect on the temperature of restoration/reduction, heat exchange, and friction. M.J.S.

N75-30499# Air Vehicle Corp., San Diego, Calif.
PROPERTIES AND BEHAVIOR OF EXPLOSION FIELDS Final Report, 1 Jul. 1969 - 30 Nov. 1974
Jan J. Rosciszewski Feb. 1975 59 p refs
(Contract F44620-69-C-0109; AF Proj. 9752)
(AD-A008941; AFOSR-75-0592TR) Avail: NTIS CSCL 19/4

The development of semi-numerical methods of solution of nonsimilarity explosion problems are discussed. This method is capable of solving many nonsimilarity explosion problems important in military technology such as explosion in the nonuniform flow field, explosion in the magnetic field, explosion in the reacting (unconfined fueler explosion) or radiating medium. The method is based on the outer expansion from the center of explosion in dimensionless radius parameter. Assuming that the process starts as a strong point explosion, the influence of the nonuniform flow field is initially small (except for density change which could be assumed to vary exponentially) and the similarity solution is satisfied (at $t = o$). The similarity solution represents a singularity for the system of equations at $t = o$. Comparison of this solution with the exact solution indicates (for the number of terms in the expansion 15 or over) identical results within 5 digits Author

N75-30500# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.
MOMENTUM TRANSFER IN HYDRODYNAMICALLY DEVELOPING LAMINAR FLOW IN A STRAIGHT CHANNEL
C. William Savery and Mohinder S. Bhatti Feb. 1975 97 p refs
(Grant NSF ENG-73-08125)
(PB-241316/9) Avail: NTIS HC $4.75 CSCL 20D

The nonlinear momentum boundary layer equation is solved exactly by the technique of equation splitting. The relations between boundary layer thickness and pressure drop with core velocity are determined by applying continuity of mass across the channel. The mechanical energy equation gives the variation of core velocity along the channel. Closed form, dimensionless expressions were obtained for all momentum transfer quantities. This analysis results in a fully developed, incremental pressure defect of (K sub infinity) = 0.5969 and an entrance length of (xi) = (0.1674) Re. Predicted axial pressure drops fall within 3% of data measured by Sparrow and coworkers. Theoretical predictions of the local friction coefficient are in agreement with the data of Hahnemann and Ehret taken along a rectangular channel. GRA

N75-30086 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
DIAC: A CHARACTERISTICS METHOD FOR COMPUTER DIALOG
K. Foerster *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 32 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft (For availability see N75-30082 21-01)

N75-30360 Imperial Coll. of Science and Technology, London (England).
NUMERICAL COMPUTATION OF PRACTICAL COMBUSTION CHAMBER FLOWS
D. B. Spalding *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 24 p refs (For availability see N75-30359 21-31)

N75-30362 Societe Generale de Constructions Electriques et Mecaniques Alsthom, Grenoble (France).
THE SIMULATION OF TURBULENCE IN IRREPRESSIBLE MODELS [LA SIMULATION DE LA TURBULENCE DANS LES MODELES PETULA]
J. P. Huffenus *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 14 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

N75-30366 Aerospace Research Labs., Wright-Patterson AFB, Ohio.
A NUMERICAL SPECTROSCOPIC TECHNIQUE FOR ANALYZING COMBUSTOR FLOWFIELDS
Michael E. Neer *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 22 p refs (For availability see N75-30359 21-31)

N75-30368 California Univ., La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
STUDIES RELATED TO TURBULENT FLOWS INVOLVING FAST CHEMICAL REACTIONS
Paul A. Libby *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 18 p refs (For availability see N75-30359 21-31)

N75-30369 Laboratoire d'Aerothermique du C.N.R.S., Meudon (France).
QUASI-EQUILIBRIUM METHOD FOR STUDY OF RELAXED FLOW [METHODE DE QUASI-EQUILIBRE POUR L'ETUDE DES ECOULEMENTS RELAXES]
R. Prudhomme *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 17 p refs In FRENCH; ENGLISH summary (For availability see N75-30359 21-31)

N75-30370 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Space Div.
CALCULATION OF THE EFFECT OF AFTERBURNING IN EXTERNAL SUPERSONIC FLOW BY MEANS OF A METHOD OF CHARACTERISTICS WITH HEAT ADDITION AND MIXING LAYER ANALYSIS
P. Mittelbach *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 16 p refs (For availability see N75-30359 21-31)

N75-30371* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
SUPERSONIC MIXING AND COMBUSTION IN PARALLEL INJECTION FLOW FIELDS
John S. Evans and Griffin Y. Anderson *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 8 p refs (For availability see N75-30359 21-31)
CSCL 20D

N75-30372 Naples Univ. (Italy). Inst. of Aerodynamics.
TURBULENT BOUNDARY LAYER IN HYBRID PROPELLANTS COMBUSTION
R. Monti *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 21 p refs (For availability see N75-30359 21-31)

N75-30374 Sheffield Univ. (England). Dept. of Chemical Engineering and Fuel Technology.
MEASUREMENT IN TURBULENT FLOWS WITH CHEMICAL REACTION
N. A. Chigier *In* AGARD Anal. and Numerical Methods for Invest. of Flow Fields with Chem. Reactions, Especially Related to Combust. May 1975 18 p refs (For availability see N75-30359 21-31)

N75-30375 Technische Hogeschool, Delft (Netherlands). Dept. of Mechanical Engineering.
SOME MEASUREMENTS AND NUMERICAL CALCULATIONS ON TURBULENT DIFFUSION FLAMES
Th. T. A. Paauw *In* AGARD Anal. and Numerical Methods for Invest. of Flow Field with Chem. Reactions, Especially Related to Combust. May 1975 11 p refs (For availability see N75-30359 21-31)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-30501 British Library Lending Div., Boston Spa (England).
THE PREPARATION AND COATING OF PHOTOGRAPHIC EMULSIONS
T. Yano Feb. 1975 23 p refs Transl. into ENGLISH from Nihon Shashin Gakkaishi (Japan), v. 36, no. 4, 1973 p 243-250
(BLL-RTS-9629) Avail: British Library Lending Div., Boston Spa, Engl.: £4.40; 7 BLL photocopy coupons

Technological changes in photographic emulsion preparation and coating are investigated. It was noted that changes in emulsion technology were confined to improvements in starting materials, especially gelatin, advancements in different production steps and equipment, and the discovery of superior sensitizers and stabilizers. Special attention was given emulsion plant setups and control procedures for the emulsion process. E.H.W.

N75-30502* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
NDIR GAS ANALYZER BASED ON ABSORPTION MODULATION RATIOS FOR KNOWN AND UNKNOWN SAMPLES
Patent
John Dimeff, inventor (to NASA) Issued 12 Aug. 1975 10 p Filed 28 Jun. 1974 Supersedes N74-28933 (12 - 18, p 2174)
(NASA-Case-ARC-10802-1; US-Patent-3,899,252;

US-Patent-Appl-SN-484208; US-Patent-Class-356-51; US-Patent-Class-205-343; US-Patent-Class-250-351; US-Patent-Class-250-373) Avail: US Patent Office CSCL 14B

A nondispersive gas analyzer is described. The analyzer is provided with means responsive to the fluctuating intensity of radiation passed through a density modulated known and unknown gas sample for generating a signal containing the frequency modulation of the samples. Included in the signal generation is a means for selectively amplifying those components directly related to the frequency of modulation of the known and unknown samples and a means for forming a ratio of said components for generating a signal proportional to the density of the known gas in the unknown gas sample.

Official Gazette of the U.S. Patent Office

N75-30503* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FLOW MEASURING APPARATUS Patent

Paul R. Prokopius, inventor (to NASA) Issued 12 Aug. 1975 8 p Filed 28 Feb. 1974 Supersedes N74-18101 (12 - 09, p 1050)

(NASA-Case-LEW-12078-1; US-Patent-3,898,882; US-Patent-Appl-SN-447124; US-Patent-Class-73-194M; US-Patent-Class-73-195) Avail: US Patent Office CSCL 14B

Apparatus for measuring the mass flow rates of the components comprising a binary gas mixture is provided. This is accomplished by directing a binary fluid or gas through a fluidic humidity sensor and then through a calorimeter which increases the temperature of the flowing binary gas. Electrical signals provided by the fluidic humidity sensor, the flow calorimeter, and a power supply which energizes or heats the calorimeter are operated in a predetermined manner to provide an output signal indicative of the mass flow rate of one of the binary gases. Thus, the mass flow rate of the other gas is allowed to be determined since the total mass flow rate is previously calculated by the instrument and is the output of operating module 19. Official Gazette of the U.S. Patent Office

N75-30504* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

FAULT TOLERANT CLOCK APPARATUS UTILIZING A CONTROLLED MINORITY OF CLOCK ELEMENTS Patent

William M. Daly (MIT, Cambridge) and John F. McKenna, Jr., inventors (to NASA) (MIT, Cambridge) Issued 19 Aug. 1975 10 p Filed 26 Apr. 1973 Supersedes N73-22386 (11 - 13, p 1528) Sponsored by NASA

(NASA-Case-MSC-12531-1; US-Patent-3,900,741; US-Patent-Appl-SN-354612; US-Patent-Class-307-204; US-Patent-Class-307-211; US-Patent-Class-307-219; US-Patent-Class-328-61; US-Patent-Class-328-62) Avail: US Patent Office CSCL 14B

A fault-tolerant clock apparatus is presented for use in digital logic systems. The apparatus maintains output pulses during component failures. Official Gazette of the U.S. Patent Office

N75-30505 Institut d'Aeronomie Spatiale de Belgique, Brussels.

TEST STAR STUDY OF PLATE REDUCTIONS OBTAINED WITH THE IAS TRIANGULATION CAMERA [ETUDE PAR ETOILES-TESTS DE LA REDUCTION DES CLICHES PRIS AU MOYEN DE LA CAMERA DE TRIANGULATION IAS]

H. Debehogne (Obs. Roy. de Belgique) and E. VanHemelrijck 1975 14 p refs In FRENCH; ENGLISH summary Submitted for publication

(Aeronomica-Acta-A-148-1975) Avail: Issuing Activity

The triangulation camera was previously used for the position and altitude determination of artificial clouds in the upper atmosphere by polynomial transformation formulae. The test star method is applied to 12 new formulas to determine the formula giving the best accuracy and the minimum working time for lower number of reference stars and plate constants. This method can be applied to other cameras, with the same characteristics as the triangulation camera. ESRO

N75-30506 Institut d'Aeronomie Spatiale de Belgique, Brussels.

LEAST SQUARES METHOD APPLIED TO ASTROMETRIC PLATE REDUCTION [METHODE DES MOINDRES CARRES APPLIQUEE A LA REDUCTION DES CLICHES ASTROMETRIQUES]

H. Debehogne (Obs. Roy. de Belgique) and E. VanHemelrijck 1975 18 p refs In FRENCH; ENGLISH summary Submitted for publication

(Aeronomica-Acta-A-149-1975) Avail: Issuing Activity

The polynomial transformation formulas between the measured (x, y) and standard coordinates (X, Y) give the normal equations by application of the least squares method. In order to check the formulas a number of test stars were chosen, treated as comets or asteroids, and compared with catalog values. The same was done with the reference stars. The arithmetical means of the differences for the two groups of stars are set out in ordinate to get a graph of the internal (reference stars) and external (test stars) error versus number of reference stars (absissas); at the junction of the two curves the optimal number of reference stars was obtained. These graphs give an idea of the accuracy of the calculations for a given instrument and a chosen formula. Computations related to the mean square error also give valuable information. The polynomial formula of the third degree gave good results, when applied to artificial cloud plates taken by a 500 mm focus distance camera.

Author (ESRO)

N75-30507 Institut d'Aeronomie Spatiale de Belgique, Brussels.

ON THE PROBLEM OF DIFFERENTIAL ABERRATIONS [CONTRIBUTION AU PROBLEME DE L'ABERRATION DIFFERENTIELLE]

H. Debehogne (Obs. Roy. de Belgique) and E. VanHemelrijck 1975 16 p refs In FRENCH; ENGLISH summary Presented at the Colloq. of the Intern. Astron. Union, Nice, Apr. 1972 Submitted for publication

(Aeronomica-Acta-A-150-1975) Avail: Issuing Activity

The differential aberration affecting the position of stellar images on astrographic plates is proportional to the square of the distance to the centerpoint. Using polynomial transformation formulas, the differential annual maximum aberrations between the center and the edge of the photographic plate were determined for instruments with different focal distances and fields (the focal distances being 30, 50, and 200 cm). ESRO

N75-30508# National Research Council of Canada, Ottawa (Ontario).

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT, 1 JANUARY - 31 MARCH 1975

31 Mar. 1975 83 p refs

(DME/NAE-1975(1); ISSN-0047-9055) Avail: NTIS HC $4.75

Two articles are presented which discuss a transmission line wave height and level transducer, and icing of fishing vessels in Canadian waters. Research projects in the following areas are reviewed briefly: analysis and simulation facilities, control and human factors engineering, developments in aerodynamics, flight research, fuels and lubricants, gas dynamics, plasma studies, high speed aerodynamics, hydraulics, low speed aerodynamics, low temperature research, marine dynamics, structural materials, and unsteady aerodynamics. M.J.S.

N75-30509*# California Univ., Los Angeles. Dept. of Meteorology.

THE POLARIMETER AND THE MULTISPECTRAL RADIOMETER AS REMOTE PROBES OF AEROSOLS Final Technical Report, 1 Sep. 1974 - 1 Sep. 1975

Jacob G. Kuriyan 1 Jan. 1975 71 p refs

(Grant NsG-1106)

(NASA-CR-143333) Avail: NTIS HC $4.25 CSCL 14B

Attempts made to establish the viability of the polarimeter as a ground based remote probe of atmospheric aerosols under varying meteorological conditions are reported. Extension radiometer data are also given and a comparison was made with polarimeter data to determine if one could complement/supplement the other. The analyses show that the two instruments are complementary devices and any information obtained from one will greatly facilitate the analysis of the other. Detailed results are given in graphical form. E.H.W.

N75-30510# Royal Aircraft Establishment, Farnborough (England).

AN INSTRUMENTATION SYSTEM FOR THE MEASUREMENT OF SOIL RESILIENCE
J. Knight and M. S. Powell Jun. 1974 21 p
(RAE-TM-IR-146; BR42287) Avail: NTIS HC $3.25

A system is described which enables a quantitative comparison to be made of the hardness of various landing zones used for dropping stores by parachute. The system is portable and battery operated; the output from an accelerometer which is mounted on a weight and dropped onto the ground is recorded on magnetic tape. Author

N75-30511*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
REFLECTANCE CHARACTERISTICS OF THE VIKING LANDER CAMERA REFERENCE TEST CHARTS
Stephen D. Wall, Ernest E. Burcher, and Daniel J. Jabson Sep. 1975 31 p refs
(NASA-TM-X-72762) Avail: NTIS HC $3.75 CSCL 14E

Reference test charts provide radiometric, colorimetric, and spatial resolution references for the Viking lander cameras on Mars. Reflectance measurements of these references are described, including the absolute bidirectional reflectance of the radiometric references and the relative spectral reflectance of both radiometric and colorimetric references. Results show that the bidirection reflectance of the radiometric references is Lambertian to within + or - 7% for incidence angles between 20 deg and 60 deg, and that their spectral reflectance is constant with wavelength to within + or - 5% over the spectral range of the cameras. Estimated accuracy of the measurements is + or - 0.05 in relative spectral reflectance. Author

N75-30512*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
BATTERY PEAK CHARGE VOLTAGE MONITOR FOR DUAL AIR DENSITY SATELLITE
Thomas A. Shull 23 Jul. 1975 10 p
(NASA-TM-X-72669) Avail: NTIS HC $3.25 CSCL 14B

A battery peak charge voltage monitor was developed for use on the dual air density satellite (DADS). This device retains a reading of the maximum voltage reached by the spacecraft battery during periods of charging, and makes it available during periods of data transmission. The monitor is connected across the battery and operates solely from the battery; it is powered continuously, with quiescent input current of only 3 milliamperes. Standard integrated circuits and a thin-film resistor network are utilized. The monitor occupies approximately 40 square centimeters of a printed-circuit board within a larger electronic package. Author

N75-30513*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
DYNAMIC TESTING OF THE KEARFOTT 2401 ACCELEROMETER Final Report
Bert Katz Jun. 1975 52 p refs
(Contract NAS8-30255)
(NASA-CR-143929; R-890) Avail: NTIS HC $4.25 CSCL 14B

A Kearfott pendulous accelerometer was integrated with a United Aircraft pulse torque servo assembly (PTSA) forced binary loop. The test objective was to measure dynamic errors due to anisoinertia and OA coupling effects. The instrument and its torque loop are described, and the technique for isolating the anisoinertia error from centripetal acceleration effects is discussed in detail. The measured anisoinertia error coefficient was 3.0 cm, and the testing confirmed that no rectified OA coupling error was present. Author

N75-30514# Council for Scientific and Industrial Research, Pretoria (South Africa).
AN AUTOMATIC CONTINUOUS FLOW ULTRAMICROSCOPIC ANALYZER FOR QUANTITATIVE AND DIMENSIONAL DETERMINATORS OF PARTICLES SUSPENDED IN LIQUID MEDIA
E. I. Akopov, M. A. Karabegov, and A. G. Ovanesjan [1974] 7 p refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 5, 1973 p 42-43
(CSIR-Ref-1156) Avail: NTIS HC $3.25

The ultramicroscopic analyzer is described, and its operational characteristics listed. Drawings and equipment specifications are included. M.J.S.

N75-30515*# ESL, Inc., Sunnyvale, Calif.
A PROCEDURE FOR STANDARDIZATION OF COLOR INFRARED FILM RESPONSE
Richard L. LaPado and Robert E. Ekstrand Washington NASA Aug. 1973 18 p refs
(Contract NAS2-7064)
(NASA-CR-2575) Avail: NTIS HC $3.25 CSCL 14E

Various problems with color infrared film used for remote sensing applications which relate to the instability or variability of the relative sensitivities of the dye layers within the film and the resultant variations in color balance are indicated. A procedure developed and utilized to optimize film response and to achieve more consistent results is described. The procedure establishes a sensitometric aim point with which all new batches of film are compared. Through the use of color compensation filters and change in basic exposure, the new film is exposed to produce imagery with the response characteristics of the aim curves. Author

N75-30516*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
BINOCULAR ATTACHMENT Patent Application
William H. King, inventor (to NASA) Filed 28 Aug. 1975 9 p
(NASA-Case-LAR-11782-1; US-Patent-Appl-SN-608482) Avail: NTIS HC $3.25 CSCL 14B

Apparatus for superimposing numerical information on the field of view of binoculars and applicable in the flying of radio-controlled model airplanes is described. Airspeed and angle of attack are sensed by sensors attached to the model airplane, telemetered to ground, and converted to numerical form. An optical system is used to display the numerical information in the field of view of the binoculars used to track the model airplane. The numerical information is focused at infinity by collimating lens enabling the user to see the object and numerical information without refocussing his eyes. NASA

N75-30517# Texas Univ., Austin.
PYROMAGNETIC INFRARED RADIATION DETECTORS Final Technical Report, 1 Jan. - 31 Dec. 1974
R. W. Bene and R. M. Walser 6 Feb. 1975 50 p refs
(Contract N00014-67-A-0126-0014)
(AD-A006480; Rept-4) Avail: NTIS CSCL 17/5

Work on the spin reorientation transition in YbFeO3 was completed. This work showed the two second order transitions associated with the spin reorientation transition. Experimental work on 15 MHz on the family of materials (CoS(2-x)Se(x) has been completed. This study investigates the detector material limitations on high frequency response. In particular the effect of eddy currents is examined both theoretically and experimentally. Also, the effect of surface layers was studied when these materials unexpectedly showed a surface layer whose thickness depended on Se concentration. This surface layer had a transition temperature which was greater than the transition temperature of the bulk. In related work, statistical dynamic calculations are being made on the pyromagnetic response of a spin system coupled to a thermal reservoir in local equilibrium with a time and space temperature distribution satisfying Fourier's law when the reservoir is driven by an incident modulated radiation absorbed at the surface. Finally, work has also been completed on a pyromagnetic study of superconductors which use an induced moment effect. GRA

N75-30518# Army Missile Research, Development and Engineering Lab., Redstone Arsenal, Ala.
THE DESIGN AND DEVELOPMENT OF A DOUBLE GAP LOOP B DOT SENSOR
Wayne T. Hudson and George R. Edlin 1 Dec. 1974 59 p refs
(AD-A009080; RD-75-23) Avail: NTIS CSCL 09/1

This report describes the design and development of a double gap loop B dot sensor in response to a need for a short rise time sensor for pulse radiation field measurements for antenna scale modeling. A sensor with a single-ended or unbalanced output was needed because this was a requirement of the

laboratory instrumentation for monitoring fast rise time pulses (on the order of 0.5 nanosecond). GRA

N75-30519# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODIFICATION AND REDESIGN OF AN AUGER ELECTRON ANALYSIS SYSTEM M.S. Thesis
James Selph Dec. 1974 66 p refs
(AD-A008706; GE/EE/74-62) Avail: NTIS CSCL 14/2

A Scanning Auger Microscope (SAM) designed by the General Electric Corporation and installed in the Air Force Avionics Laboratory (AFAL) did not function properly. Malfunctions were identified and corrected. Necessary modifications and redesign of units include: design of an emitter source; power supply modifications; design and fabrication of alignment mechanism, bake-out assemblies, and filament testing units; redesign of the detector circuit; rearrangement of major components in the UHV system; redesign of the voltage distribution system for a sputter fun. Successful Auger electron analyses were demonstrated on various samples containing Nb, Cl, C, N, O, Cu, Fe, Ni, Y, Sm, and Si. GRA

N75-30520# Air Force Systems Command, Wright-Patterson AFB, Ohio.
EVALUATING THE EFFECTIVENESS OF THE PROCEDURES USED FOR STUDYING THE FREQUENCY CHARACTERISTIC OF A HOT-WIRE ANEMOMETER Foreign Technology Div.
V. A. Shcherbakov and V. N. Glaznev 28 Feb. 1975 10 p refs Transl. into ENGLISH from Izv. Sibirak. Otd. Akad. Nauk SSSR (USSR), no. 3, 1969 p 47-49
(AD-A008632; FTD-HT-23-1036-75) Avail: NTIS CSCL 14/2

The article gives a direct method for estimating the amplitude-frequency characteristics and compares the estimation according to two other methods. GRA

N75-30521# Army Materiel Command, Texarkana, Tex.
A STRESS-STRAIN METHOD FOR TUNING A HOLOGRAPHIC NONDESTRUCTIVE TESTING SYSTEM Final Report
W. R. Klappert Apr. 1975 118 p refs
(AD-A009205; USAMC-ITC-02-08-75-109) Avail: NTIS CSCL 13/3

The GC Optronics Mobile System was designed to inspect sandwich-type building panels using holography. The developer properly set the system for the inspection of a particular panel and the system gave good results. However, the evaluators discovered that when a panel of different characteristics was inspected, the system needed adjustment. It was also found that finding the new proper setting was no easy task. This project was then undertaken in an attempt to simplify the process of adjusting to a new setting. GRA

N75-30522# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
GYRO DORMANCY INVESTIGATION
R. Carson, J. Miola, R. Royle, and H. Stoffel Mar. 1974 46 p refs
(Contract F02701-73-C-0019)
(AD-A009222; R-803; SAMSO-TR-74-216) Avail: NTIS CSCL 17/7

The report details test procedures to characterize a single-degree-of-freedom floated inertial grade gyroscope to be used in dormant applications. Also included are some trial test results obtained with a CSDL 13-IRIG and a description of the thermal test fixture employed. GRA

N75-30523# National Bureau of Standards, Washington, D.C. Inst. for Basic Standards.
CALIBRATION OF PLATINUM RESISTANCE THERMOMETERS USING AN INTERCOMPARISON SCHEME Final Report
R. M. Schoonover and H. H. Ku Dec. 1974 20 p refs
(COM-75-10525/4; NBSIR-74-586) Avail: NTIS HC $3.25 CSCL 14B

The report describes a procedure for the calibration of capsule type platinum resistance thermometers, (PRT), using one or more standard platinum resistance thermometers (SPRT) in the temperature range of 0 - 35 C. These PRT were designed to be used in density work through hydrostatic weighing where SPRT cannot be used because of space and other limitations, but the procedure is thought to be generally useful in other applications as well. The schedule of intercomparisons was designed to eliminate possible trends in temperature variations of the constant temperature bath setup. Results of calibration can be expressed either in terms of the two constants alpha and delta, or in a table relating R(t)/R(O) to t sub 68 within the range of calibrations. GRA

N75-30085 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE EFFECT OF SMALL ROTATION ON THE BEHAVIOR OF PITOT TUBES
K. Einsfeld *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 15 p refs In GERMAN; ENGLISH summary
(For availability see N75-30082 21-01)

N75-30120 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
MEASUREMENT OF FORCES AND MOMENTS ON MODEL COMPONENTS USING STRAIN GAGES [MESSUNG VON KRAEFTEN AN MODELLKOMPONENTEN MITTELS DEHNUNGSMESSTREIFEN]
P. Raab *In* DGLR Force Meas. on Parts of Wind Tunnel Models 1975 p 161-179 In GERMAN
(For availability see N75-30112 21-02)

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-30524* National Aeronautics and Space Administration. Pasadena Office, Calif.
ELECTRIC POWER GENERATION SYSTEM DIRECTORY FROM LASER POWER Patent
Katsunori Shimada, inventor (to NASA) (JPL) Issued 12 Aug. 1975 7 p Filed 27 Mar. 1974 Supersedes N74-19702 (12 - 11, p 1250) Sponsored by NASA
(NASA-Case-NPO-13308-1; US-Patent-3,899,696; US-Patent-Appl-SN-455165; US-Patent-Class-310-4; US-Patent-Class-331-DIG.1) Avail: US Patent Office CSCL 20E

A pool of liquid cesium is spaced apart from a collector in an enclosed vessel. A laser beam is directed to the liquid cesium pool. The beam is focused to provide sufficient laser power density at the liquid cesium surface to vaporize some of the liquid cesium and ionize the vaporized cesium, and thereby form cesium ions and free electrons. The work function of the collector is different from that of cesium. When the work function is higher, the formed ions are attracted to the collector, and the electrons are attracted by the liquid cesium. Electrons and ions are attracted by the collector and liquid cesium respectively when the work function of the collector is less than that of cesium. Thus, a potential difference is generated by the liquid cesium pool and the collector, sufficient to apply electric power to a load.
Official Gazette of the U.S. Patent Office

N75-30525*# National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
THE USE OF LASERS FOR HYDROGRAPHIC STUDIES
Hongsuk H. Kim, ed. and Philip T. Ryan, ed. Washington 1975 202 p refs Symp. held at Wallops Island, Va., 12 Sep. 1973
(NASA-SP-375) Avail: NTIS HC $7.25 CSCL 20E

The utilization of remote laser sensors in water pollution detection and identification, coastal environmental monitoring, and bathymetric depth sounding, is discussed. For individual titles, see N75-30526 through N75-30539.

N75-30526* Delaware Univ., Newark.
REQUIREMENTS FOR AIRBORNE LASER SYSTEMS USED IN COASTAL STUDIES
V. Klemas *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 35-46 refs (For availability see N75-30525 21-36)
CSCL 20E

Requirements for airborne laser systems are considered for the following applications: (1) photo-optical determination of shallow water wave spectra; (2) bathymetry in highly turbid waters; (3) chlorophyll concentration monitoring; and (4) oil dispersion mapping. Author

N75-30527* National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
USE OF LIDAR SYSTEMS IN MEASURING CERTAIN PHYSICAL OCEANOGRAPHIC PARAMETERS
Davison T. Chen *In its* The Use of Lasers for Hydrographic Studies 1975 p 47-50 refs (For availability see N75-30525 21-36)
CSCL 20E

Remote sensing techniques, such as LIDAR, are the only observation methods which are capable of fast scanning over a vast area to produce synoptic views which are necessary for time and space study of the ocean. However, due to the very nature of the way data are collected, all the information thus obtained is confined, to or in the immediate neighborhood of the surface. Nevertheless, all the physical processes in the ocean are controlled mainly by both surface and subsurface parameters; they act and interact among themselves and produce the phenomena we actually observe in time and space. Remote sensing techniques are very effective for those phenomena controlled by surface parameters which account for most of the crucial problems in physical oceanography. Author

N75-30528* Naval Air Development Center, Warminster, Pa.
EXPERIMENTAL RESULTS OF A CONTINUOUS WAVE LASER RADAR SYSTEM
Kenneth J. Petri and Robert F. Starry *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 51-66 refs (For availability see N75-30525 21-36)
CSCL 20E

A 1.06 micron CW laser radar system was used to establish the feasibility of remotely measuring sea surface wind magnitude and direction. Simultaneous correlation of collected laser data with the environment was established by using meteorological instruments. The experimental system and methods of analysis are summarized. Results of the experiments, including wind magnitude and direction correlation, are reported. Results are compared with theoretical predictions. Author

N75-30529* Ohio State Univ., Columbus. ElectroScience Lab.
AN OPTICAL RADAR FOR AIRBORNE USE OVER NATURAL WATERS
C. A. Levis, W. G. Swarner, C. Prettyman, and G. W. Reinhardt *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 67-80 refs (For availability see N75-30525 21-36)
(Contracts AF 33(657)-11198; AF 33(615)-3667)
CSCL 20E

An optical radar for detecting targets in natural waters was built and tested in the Gulf of Mexico. The transmitter consists of a Q switched neodymium glass laser, with output amplified and doubled in KDP to 0.53 micrometer wavelength. The receiver incorporates a noval optical spatial filter to reduce the dynamic range required of the photodetector to a reasonable value. Detection of targets to a depth of 26 meters (84 feet) was achieved with a considerable sensitivity margin. The sensitivity of the radar is highly dependent on the optical attenuation coefficient. In general, measured returns fell between the values predicted on the basis of monopath and multipath attenuation. By means of simple physical arguments, a radar equation for the system was derived. To validate this theoretical model, measurements of optical attenuation and of water surface behavior were also instrumented, and some of these results are given. Author

N75-30530* Sparcom, Inc., Alexandria, Va.
RECENT ADVANCES IN THE APPLICATIONS OF PULSED LASERS IN THE HYDROSPHERE
George D. Hickman *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 81-88 refs (For availability see N75-30525 21-36)
CSCL 20E

Laboratory and field measurements have been performed on the transmission/scattering characteristics of a pulsed neon laser as a function of water turbidity. These results have been used to establish the criteria for an airborne laser bathymetry system. Extensive measurements have been made of laser induced fluorescence using a pulsed tunable dye laser. Feasibility has been demonstrated for remote detection and possible identification of various types of algae and oils. Similar measurements made on a wide variety of organic dyes have shown this technique to have applications in remote measurements of subsurface currents, temperature and salinity. Author

N75-30531* York Univ., Toronto (Ontario).
UNDERWATER PROBING WITH LASER RADAR
A. I. Carswell and Sebastian Sizgoric *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 89-104 refs (For availability see N75-30525 21-36)
CSCL 20E

Recent advances in laser and electro optics technology have greatly enhanced the feasibility of active optical probing techniques aimed at the remote sensing of water parameters. This paper describes a LIDAR (laser radar) that has been designed and constructed for underwater probing. The influence of the optical properties of water on the general design parameters of a LIDAR system is considered. Discussion of the specific details in the choice of the constructed LIDAR is given. This system utilizes a cavity dumped argon ion laser transmitter capable of 50 watt peak powers, 10 nanosecond pulses and megahertz pulse repetition rates at 10 different wavelengths in the blue green region of the spectrum. The performance of the system, in proving various types of water, is demonstrated by summarizing the results of initial laboratory and field experiments. Author

N75-30532* Avco-Everett Research Lab., Everett, Mass.
REMOTE MEASUREMENT OF OCEAN TEMPERATURE FROM DEPOLARIZATION IN RAMAN SCATTERING
Chin H. Chang and Lee A. Young *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 105-112 refs (For availability see N75-30525 21-36)
CSCL 20E

Ocean temperatures may be mapped in three dimensions from an aircraft down to depths of 2 to 4 attenuation lengths by monitoring Raman radiation backscattered from a laser beam. This paper describes laboratory experiments on the temperature dependence of Raman spectra of saline solutions and calculations of the expected performance of a field system. The Raman technique is of greatest potential utility in coastal and estuarine waters where gradients are relatively high. It is estimated that seawater temperature may be measured to a statistical precision of 0.5 C at depths to four attenuation lengths in two meter water, using one Joule of transmitted laser energy. Author

N75-30533* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MEASUREMENT OF RAMAN SPECTRA OF H2O AND SO4(-) IN SEAWATER
William M. Houghton *In its* The Use of Lasers for Hydrographic Studies 1975 p 113-118 (For availability see N75-30525 21-36)
CSCL 20E

A study of applying laser Raman spectroscopy to remote sensing of the sulfate ion in sea water is in progress. The SO4 Raman spectrum has been obtained from true sea water samples in the laboratory using a CW laser Raman spectrometric system. Radiometric calculations indicate the feasibility of obtaining usable SO4 Raman signals in a field experiment. One of serious difficulties expected in the field experiment would be from fluorescence of phytoplankton and organics. Author

N75-30534* Toronto Univ. (Ontario).
DEVELOPMENT OF A LASER FLUOROSENSOR FOR AIRBORNE SURVEYING OF THE AQUATIC ENVIRONMENT
Michael P. F. Bristow (Canada Centre for Remote Sensing), Wayne R. Houston, and Raymond M. Measures *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 119-136 refs (For availability see N75-30525 21-36)
CSCL 20E

A field based laser fluorosensor, employing a pulsed nitrogen laser and telescope photomultiplier detector system, has been successfully tested at night from a cliff top site overlooking Lake Ontario providing target ranges greater than 274 meters. Remotely sensed spectra and amplitude changes in the fluorescence emission of natural waters have shown potential as a water quality indicator. In this connection, a convenient internal reference standard with which to gauge the amplitude of the fluorescence signal is realized in the form of the concurrent water Raman emission. Remote measurements of oil fluorescence emission spectra suggest that airborne laser fluorosensors are capable of detecting and characterizing the oil in a given slick and that environmental aging of these slicks does not significantly alter their fluorescence emission signature. Author

N75-30535* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MULTIWAVELENGTH LIDAR FOR REMOTE SENSING OF CHLOROPHYLL A IN ALGAE AND PHYTOPLANKTON
Peter B. Mumola, Olin Jarrett, Jr., and Clarence A. Brown, Jr. *In its* The Use of Lasers for Hydrographic Studies 1975 p 137-146 (For availability see N75-30525 21-36)
CSCL 20E

A theoretical and experimental analysis of laser induced fluorescence for remote detection of chlorophyll A in living algae and phytoplankton is presented. The fluorescent properties of various species of algae representative of the different color groups are described. Laboratory measurements of fluorescent scattering cross sections is discussed and quantitive data presented. A scattering matrix model is developed to demonstrate the essential requirement of multiwavelength laser excitation in order to make accurate quantitative measurements of chlorophyll A concentration when more than one color group of algae is present in the water. A practical airborne laser fluorosensor design is considered and analysis of field data discussed. Successful operation of the Langley ALOPE (airborne LIDAR oceanographic probing experiment) system is described and field measurements presented. Accurate knowledge of alpha, the optical attenuation coefficient of the water, is shown to be essential for quantitative analysis of chlorophyll A concentration. The feasibility of remotely measuring alpha by laser radar is discussed. Author

N75-30536* Massachusetts Univ., Gloucester.
THE FLUORESCENCE OF CHLOROPHYLL AND YELLOW SUBSTANCES IN NATURAL WATERS: A NOTE ON THE PROBLEMS OF MEASUREMENT AND THE IMPORTANCE OF THEIR REMOTE SENSING
Charles S. Yentsch *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 147-152 (For availability see N75-30525 21-36)
CSCL 20E

There are two chromophylls which, if sensed remotely from high altitude, would revolutionize the ability to survey large areas of the world's oceans. The chromophylls of importance are: the photosynthetic pigments of plankton algae and a group of organic materials frequently termed dissolved yellow substances. These are derived from plants and carried into the ocean by fresh water inflow. The attenuation of light by phytoplankton is characterized by two distinctive bands (450, 675 nm) which represent absorption by chloroplastic pigments. Yellow substances are characterized by a strong ultraviolet absorption which tails over into the visible region. It is emphasized that chlorophyll determination could be a unique technique for estimating the extent of eutrophication in coastal waters, and that a high altitude observer equipped with temperature, chlorophyll and yellow substance sensors has the possibility of detecting the magnitude of eutrophication and its sources by using laser induced fluorescent devices. Author

N75-30537* Toronto Univ. (Ontario). Inst. for Aerospace Studies.
LIFES: LASER INDUCED FLUORESCENCE AND ENVIRONMENTAL SENSING
Wayne R. Houston, D. G. Stephenson, and Raymond M. Measures *In* NASA. Wallops Station The Use of Lasers for Hydrographic Studies 1975 p 153-169 refs (For availability see N75-30525 21-36)
CSCL 20E

A laboratory investigation has been conducted to evaluate the detection and identification capabilities of laser induced fluorescence as a remote sensing technique for the marine environment. The relative merits of fluorescence parameters including emission and excitation profiles, intensity and lifetime measurements are discussed in relation to the identification of specific targets of the marine environment including crude oils, refined petroleum products, fish oils and algae. Temporal profiles displaying the variation of lifetime with emission wavelength have proven to add a new dimension of specificity and simplicity to the technique. Author

N75-30538* Department of Environment, Ottawa (Ontario).
A REMOTE SENSING LASER FLUOROMETER
R. A. ONeill, Anthony R. Davis, Harry G. Gross, and J. Kruus *In* NASA. Wallops Station The Use of Lasers for Hydrographic studies 1975 p 173-196 refs (For availability see N75-30525 21-36)
CSCL 20E

A sensor is reported which is able to identify certain specific substances in water by means of their fluorescence spectra. In particular, the sensor detects oil, ligninsulfonates and chlorophyll. The device is able to measure the fluorescence spectra of water at ranges up to 75 m and to detect oil spills on water at altitudes up to 300 m. Blue light from a laser is used to excite the fluorescence of the target. Any light from the ambient background illumination, from the reflected laser light or from the induced fluorescence is gathered by a small telescope focused on the target. Optical filters are used to block the reflected laser light and to select the wavelengths of interest in the fluorescence spectrum of the target. The remaining light is detected with a photomultiplier tube. The amplitude of the laser induced fluorescence in the wavelength interval selected by the optical filters is displayed on a meter or strip chart recorder. Author

N75-30539* National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
AN AIRBORNE LASER FLUOROSENSOR FOR THE DETECTION OF OIL ON WATER
Hongsuk H. Kim and George D. Hickman (Sparcom, Inc.) *In its* The Use of Lasers for Hydrographic Studies 1975 p 197-202 refs (For availability see N75-30525 21-36)
CSCL 20E

An airborne laser fluorosensor for the detection of oil derivatives on water has been tested. The system transmits 337 nm UV radiation at the rate of 100 pulses per second and monitors fluorescent emission at 540 nm. Daylight flight tests were made over the areas of controlled oil spills and additional reconnaissance flights were made over a 50 km stretch of the Delaware River to establish ambient oil baseline in the river. The results show that the device is capable of monitoring and mapping out extremely low level oil on water which cannot be identified by ordinary photographic method. Author

N75-30540*# Scientific Translation Service, Santa Barbara, Calif.
BALANCING OF ROTATING BODIES BY LASER BEAM
V. M. Suminov and A. K. Skvorcheskiy Washington NASA Aug. 1975 195 p refs Transl. into ENGLISH of the book "Uravnoveshivaniye Vrashchayushchikhsya tel Luchom Lazera" Moscow, Mashinostroyeniye Press, 1974 p 1-175
(Contract NASw-2483)
(NASA-TT-F-16374) Avail: NTIS HC $7.00 CSCL 20E

Questions associated with the development and justification of the basic methods of automatic laser balancing are considered. The processes of interaction between the laser beam and the surface of rotating bodies, and the determination of the basic technological factors affecting the accuracy and efficiency of balancing were investigated. Author

N75-30541*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SATELLITE LASER RANGING WORK AT THE GODDARD SPACE FLIGHT CENTER
Thomas E. McGunigal, Walter J. Carrion, Louis O. Caudill, Charles R. Grant, Thomas S. Johnson, Don A. Premo, Paul L. Spadin, and George C. Winston Jul. 1975 15 p refs Presented at

Western Elec. Show and Convention (WESCON 75), San Francisco, 16-19 Sep. 1975 Submitted for publication
(NASA-TM-X-70948; X-723-75-172) Avail: NTIS HC $3.25

Laser ranging systems, their range and accuracy capabilities, and plannned improvements for future systems are discussed, the systems include one fixed and two mobile lasers ranging systems. They have demonstrated better than 10 cm accuracy both on a carefully surveyed ground range and in regular satellite ranging operations. They are capable of ranging to all currently launched retroreflector equipped satellites with the exception of Timation III. A third mobile system is discussed which will be accurate to better than 5 cm and will be capable of ranging to distant satellites such as Timation III and LAGEOS. Author

N75-30542*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPACEBORNE CO2 LASER COMMUNICATIONS SYSTEMS
John H. McElroy, Nelson McAvoy, Edward H. Johnson, Frank E. Goodwin (Hughes Aircraft Co.), and B. J. Peyton (Airborne Instr. Lab.) Jul. 1975 54 p refs Proposed for Presentation at the IEEE Electron. and Aerospace Systems Conf., Washington, D. C., 29 Sep. - 1 Oct. 1975 Submitted for publication
(NASA-TM-X-70947; X-723-75-171) Avail: NTIS HC $4.25 CSCL 20E

Projections of the growth of earth-sensing systems for the latter half of the 1980's show a data transmission requirement of 300 Mbps and above. Mission constraints and objectives lead to the conclusion that the most efficient technique to return the data from the sensing satellite to a ground station is through a geosynchronous data relay satellite. Of the two links that are involved (sensing satellite to relay satellite and relay satellite to ground), a laser system is most attractive for the space-to-space link. The development of CO2 laser systems for space-to-space applications is discussed with the completion of a 300 Mpbs data relay receiver and its modification into a transceiver. The technology and state-of-the-art of such systems are described in detail. Author

N75-30543*# Raytheon Co., Sudbury, Mass. Advanced Development Lab.
DATA ANALYSIS STUDY AND PERFORMANCE EVALUATION OF THE SCANNING LASER DOPPLER SYSTEM Interim Report
C. M. Sonnenschein, C. A. Dimarzio, and D. H. Clippinger 16 Dec. 1974 51 p
(Contract NAS8-30795)
(NASA-CR-143928; ER74-4449) Avail: NTIS HC $4.25 CSCL 20E

A simulation program which provided information on theoretically expected vortex spectra, evaluations of potential algorithms, and expected location accuracies for given scan patterns is presented. Field tests using an aircraft engine flow field and aircraft vortices during flyby tests were compared to the results of the simulation. From these studies, a vortex location algorithm was developed which provided vortex location for one or two vortices as a function of time. Results of this algorithm used on data from flyby tests were used to study vortex transport, to evaluate system performance, and to provide suggestions for real-time vortex location algorithms. The results of real-time analysis were compared to those which were expected based on theoretical considerations. Author

N75-30544# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
THE ROLE OF GAS FLOW AND TURBULENCE IN ELECTRIC DISCHARGE LASERS
Josef Shwart and E. Wasserstrom [1974] 39 p refs
(TAE-245) Avail: NTIS HC $3.75

Effects of gas flow and turbulences on glow discharges and electric lasers are discussed. A model for a discharge in a flowing gas is presented, and using this model, some specific properties of the discharge are computed and compared with available experimental results. The effect of gas flow on the stability of the discharge is discussed, and some new results are presented. Author

N75-30545# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
PROPAGATION OF HIGH-POWER LASER RADIATION IN PARTIALLY IONIZED GASES Physical Sciences Research Papers
Robert J. Papa and Richard L. Taylor 23 Oct. 1974 80 p refs
(AF Proj. 2153)
(AD-A006111; AFCRL-PSRP-607; AFCRL-TR-74-0532) Avail: NTIS CSCL 20/9

When a laser beam of sufficiently high intensity interacts with a weakly ionized gas, the nonuniform deposition of laser energy into the electron gas causes heating of the electrons, ions, and neutral gas. Eventually, the neutral gas will break-down and become more highly ionized. This ionization can seriously limit the amount of laser energy that can damage a target. A multifluid model has been devised to describe the many physical processes that occur when the high power laser wave interacts with the partially ionized gas. A flexible computer program has been developed to numerically integrate the multifluid plasma transport equations coupled with Maxwell's equations. The computer program is sufficiently general so as to be capable of describing target vaporization, with diffusion and ionization of target material into an ambient gas. In this report, only the modification of an ambient gas by the laser radiation is studied. GRA

N75-30546# Naval Research Lab., Washington, D.C.
HIGH ENERGY LASER WINDOWS Semiannual Report, 1 Jul. - 31 Dec. 1974
R. W. Rice 31 Dec. 1974 62 p refs
(ARPA Order 2031)
(AD-A009003; SAR-5) Avail: NTIS CSCL 20/5

Progress has continued toward the goal of understanding and diminishing absorption and increasing strength and toughness of alkali halides for laser windows. The emphasis has continued to center on KCl as a viable candidate and a model for other halides, but work to transfer KCl technology to KBr has begun. Discussed is research on: press forged KCl--microstructure development and mechanical and optical properties; summary of 10.6 micron laser testing of uncoated KCl; multiphonon absorption in ionic crystals; multiphonon absorption studies; growth, surface finishing and optical characterication of sodium fluoride and other fluoride laser window crystals; spectral emittance of fluoride laser window crystals; new instrumentation; and fracture analysis of ZnSe. GRA

N75-30547# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
USING A LASER FOR STUDYING TURBULENCE NEAR A WALL
G. I. Efimenko, V. V. Orlov, and E. M. Khabakhpasheva 4 Mar. 1975 10 p refs Transl. into ENGLISH from Akad. Nauk SSR Sibirskoe Otd. Izv. (USSR), no. 13(3), 1968 p 43-45
(AD-A008760; FTD-HT-23-1034-75) Avail: NTIS CSCL 14/2

The use of photography for studying flow processes which have been disrupted by introducing extraneous immobile pick-ups was investigated. The flow visualization method is found to be acceptable for studying the mechanism of turbulent flow in a thin region near a wall with a high intensity of turbulence. Laser applications in flow visualization were investigated. M.J.S.

N75-30548# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
SPECTRAL EMITTANCE MEASUREMENT ON SOME LASER WINDOW MATERIALS Physical Sciences Research Papers
Lyn H. Skolnik 2 Dec. 1974 22 p refs
(AF Proj. 3326)
(AD-A006034; AFCRL-PSRP-615; AFCRL-TR-74-0590) Avail: NTIS CSCL 20/6

A cryogenic emittance spectrometer for measuring absorption coefficients in the 2.5 to 14 micrometer region is described. The spectrometer is modular in design and uses a liquid nitrogen-cooled circular variable filter (CVF) as the monochromator element. By using an electrically heated sample holder, temperature as well as frequency dependence of the absorption coefficient is obtained. Some representative spectra of high resistivity GaAs, CVD ZnSe, and RAP KCl are presented. GaAs

appears to be at least partially dominated by multiphonon absorption near 10.6 micrometers, while both ZnSe and KCl show intrinsic loss mechanisms in this region at room temperature. GRA

N75-30549# Rochester Univ., N.Y. Dept. of Physics and Astronomy.
COHERENCE PHENOMENA IN INTERACTION AND RADIATION PROCESSES Final Report, 1 Oct. 1971 - 31 Dec. 1974
Emil Wolf Dec. 1974 22 p refs
(Grant AF-AFOSR-2150-72; AF Proj. 9751)
(AD-A006386; AFOSR-75-0381TR) Avail: NTIS CSCL 20/6

The research was chiefly concerned with coherence effects in electromagnetic fields. Both free fields and fields interacting with matter were considered. Master equation techniques were applied to problems involving spontaneous emission. Fluctuation-dissipation theorems for systems in non-thermal equilibrium were derived and applied to the study of the laser threshold region. The exact mode expansion was derived for the electromagnetic field in a spatially dispersive model dielectric forming a plane parallel slab and was applied to the problem of refraction and reflection on a spatially dispersive half-space. A new derivation was obtained of the multipole expansion of an electromagnetic field generated by a localized monochromatic charge-current distribution. New representation for the multipole moments was also found. GRA

N75-30550# Westinghouse Research Labs., Pittsburgh, Pa.
PERFECTION OF CaLaSOAP Nd LASER MATERIAL Final Report, 1 Nov. 1973 - 31 Oct. 1974
R. H. Hopkins, K. B. Steinbruegge, T. Henningsten, R. G. Seidensticker, and C. S. Duncan Feb. 1975 125 p refs
(Contract F33615-74-C-5023; AF Proj. 7371)
(AD-A008782; AFML-TR-74-281) Avail: NTIS CSCL 20/5

Calcium lanthanum silicate oxyapatite (CaLaSOAP) is an intermediate gain laser material developed for high energy storage and high average power Q-switching applications. The objective of this program was to increase the bulk and surface laser damage resistance of CaLaSOAP crystals and the yield of laser quality boules so that the full potential of the material could be realized in Q-switched laser ranger systems. Crack-free crystals up to 0.7 in. diameter were grown and fabricated into optically homogeneous 0.375 diameter laser rods free from inclusions detectable by laser light scattering. The two types of inclusions identified in CaLaSOAP--silica-rich dielectric particles and minute iridium platelets--were reduced below the limits of normal detectability by control of furnace gradient and atmosphere. While the damage resistance of CaLaSOAP has been more than doubled during this program, and the yield of laser rods nearly tripled, further achievements in growth technology are required to fully utilize CaLaSOAP. GRA

N75-30551# United Aircraft Corp., East Hartford, Conn.
MICROWAVE WAVEGUIDE MODULATORS FOR CO2 LASERS Semiannual Technical Report, 25 Sep. 1974 - 25 Mar. 1975
P. K. Cheo, D. Fradin, and R. Wagner 31 Mar. 1975 49 p refs
(Contract N00014-73-C-0087; ARPA Order 1860)
(AD-A009101; UARL-R921513-10) Avail: NTIS CSCL 20/5

The long-range objective of this program is to develop an efficient and reliable ultra-wideband waveguide modulator for CO2 lasers that will be useful for high resolution, imaging optical radars and high-data-rate optical communication systems. During this reporting period three significant advances have been made in the modulator development. The first development involves improvements in the quality of the GaAs waveguide structure and the reliability of producing thinfilm waveguides with acceptable quality; the second development, involves improvements in optical coupling efficiency; and the last development involves improvements in the reproducibility of the microwave characteristics of the waveguide modulator. With the exception of the growth of the bulk GaAs crystals, which are currently purchased from two different vendors, the complete material processing and waveguide synthesis are being carried out at our laboratory under controlled procedures. Waveguide structures with lengths in excess of 2 cm, which include two 3 mm x 3 mm grating couplers at the ends can now be reliably made with any desirable average thickness. GRA

N75-30552# Hughes Research Labs., Malibu, Calif.
THE 10.6 MICRON PARAMETRIC FREQUENCY CONVERTER Semiannual Technical Report, 1 Sep. 1974 - 28 Feb. 1975
R. L. Abrams Mar. 1975 34 p refs
(Contract N00014-75-C-0089; ARPA Order 1806)
(AD-A009112) Avail: NTIS CSCL 20/6

This program addresses an approach which should lead to a new class of electro-optical devices such as single sideband modulators, tunable local oscillators, and frequency shifters, using the resonant interaction of optical and microwave fields in a gas whose energy level structure is controlled by an applied electric field (Stark effect). The molecule NH2D has an infrared absorption line which may be tuned into resonance with the P(20) 10.6 micrometer CO2 laser transition by application of an electric field. The authors exploited this interaction to frequency stabilize a gigahertz tunable waveguide CO2 laser, demonstrating precise control of the waveguide laser frequency over a bandwidth greater than 1 GHz, and solving one of the major problems in CO2 laser frequency control. The experience with these interactions in Stark tunable molecules has stimulated the concepts and ideas which are being implemented in this program. GRA

N75-30553# Colorado Univ., Boulder. Dept. of Physics.
LASER LIGHT SCATTERING FROM ELECTRONS AND PHONONS IN WIDE BANDGAP SEMICONDUCTORS Final Report, Jun. - Aug. 1974
J. F. Scott Feb. 1975 36 p refs
(Contract F33615-74-C-4018; AF Proj. 7885)
(AD-A008797; ARL-75-0006) Avail: NTIS CSCL 20/12

The detection and characterization of impurity states in II-VI and I-III-VI(2) semiconductors was investigated. Three techniques were employed to this end: (1) EPR at various temperatures; (2) local mode vibrational Raman spectroscopy; (3) spin-flip laser scattering at very high fields (greater than or equal to 150 kG). These studies of impurity states were conducted to facilitate the development of quality control standards for two important classes of semiconductors, and substitutional impurities play a key role in the operation of p-n junction devices in these materials. It was found that the detection of impurity states with very high g-values (of order ten) might lead to spin-flip lasers operative in the near IR with large tuning ranges. Impurities with g approximately equal to 8 were found in both CuAlS2 and CuGaS2 in the present study. Author

N75-30554# Avco-Everett Research Lab., Everett, Mass.
CARBON DIOXIDE ELECTRIC DISCHARGE LASER KINETICS HANDBOOK Final Report, 2 Jul. 1973 - 30 Jun. 1974
D. H. Douglas-Hamilton Apr. 1975 202 p refs
(Contract F29601-73-C-0116; AF Proj. 317J)
(AD-A008650; AFWL-TR-74-216) Avail: NTIS CSCL 20/5

A theoretical model of the CO2 laser system is developed. Each vibrational mode in the system is assumed to reach internal equilibrium rapidly, permitting description of the system by six temperatures (CO2 nu1, nu2, and nu3, N2, CO, and kinetic). The various excitation and transfer processes exchanging energy between these modes are discussed and a summary of available data on the relevant process rates has been collected. The six differential equations corresponding to the six vibrational temperatures are solved numerically and the laser flux and gain calculated as function of time. This model is applied to the prediction of behavior in pulsed lasers and amplifiers. The predictions of gain and laser output are compared with experiments performed on different lasers at AERL, at both atmospheric and 1/10 atmospheric pressure. Gain and laser output measurements have been performed on the laser Humdinger Junior at temperatures near 200K, as well as near 300K. Less conventional gas mixtures have been investigated theoretically and experimentally. GRA

N75-30555# Stanford Research Inst., Menlo Park, Calif.
LASER DAMAGE PHENOMENA IN MATERIALS Interim Report, 1 Nov. 1973 - 31 Oct. 1974
T. J. Magee 4 Feb. 1975 53 p refs

(Contract F44620-73-C-0019; AF Proj. 9751; SRI Proj. PYU-2266)
(AD-A008879; AFOSR-75-0389TR) Avail: NTIS CSCL 20/6

This report describes progress on a program to characterize laser induced damage in CdTe, ZnSe and KCl and to identify the role of microstructural defects in altering infrared transmission of laser windows and optical coatings. GRA

N75-30556# Stanford Univ., Calif. Labs. of Physics.
FREE ELECTRON LASER PROJECT Final Report, 1 Oct. 1975 - 30 Sep. 1974
H. A. Schwettman and J. M. J. Madey 30 Sep. 1974 49 p refs
(Contract F44620-73-C-0017; AF Proj. 9768; AF Proj. 6813)
(AD-A008878; AFOSR-75-0582TR) Avail: NTIS CSCL 20/5

Progress attained during the period between 1 October 1972 and 30 September 1974 on the Free Electron Laser Program is reported. The program entails evaluating the feasibility of a new technique for laser excitation leading to tunable, very high-powered lasers at frequency ranges between far infrared and soft X-ray. The technique involves a relativistic electron beam traveling through a transverse, static spatially periodic, magnetic field. The electron beam is supplied by the Stanford Superconducting Linear Accelerator. This report includes a general description of the program, a summary of the scientific background, descriptions of experimental facilities, results to date, and future research plans. GRA

N75-30557# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A METHOD OF TIME RESOLVING THE MASS SPECTRUM PRODUCED BY LASER VAPORIZATION OF SOLIDS M.S. Thesis
Charles R. Thomas Mar. 1975 45 p refs
(AD-A008655; GNE/PH/75-12) Avail: NTIS CSCL 07/4

A method of coupling a laser and time-of-flight mass spectrometer to obtain time resolved data was developed. Studies of the mass spectra produced by laser vaporization of solid materials in a vacuum were then performed. A continuous wave (CW) carbon dioxide laser was used to irradiate proposed aircraft windscreen materials with a maximum power density of 5 kilowatts/sq cm. The intensity of species emanating in the laser-induced vapor plume was measured as a function of laser-solid interaction time. For both windscreen materials investigated it was found that acetylene (C_2H_2) was the predominant vapor species evolving from the laser heated samples. A correlation between the degree of material charring in the vicinity of the vaporization area and the rates of species evolution from the sample surface was also noted. GRA

N75-30558# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A NEW APPROACH TO MAKING ABSOLUTE FREQUENCY MEASUREMENTS FOR HIGH RESOLUTION SPECTROSCOPY M.S. Thesis, 1974
William A. Danne 6 Jan. 1975 76 p refs
(AD-A008654; GNE/PH/75-4) Avail: NTIS CSCL 14/2

High resolution spectroscopy with tunable lasers in the near infrared frequency range requires an absolute frequency measurement technique to allow Doppler-limited spectroscopy to be done. A feasibility study of a new technique, involving the rationing of the Doppler shift frequencies of an unknown frequency laser and a known frequency standard laser, was proposed. The feasibility study emphasized showing how accurately the ratio of the Doppler shift frequencies could be measured, since the ratio of the Doppler shift frequencies is equal to the ratio of the original laser frequencies. The feasibility experiment used a HeNe and a HeCd laser and a screw-worm driven translation stage for moving a mirror back and forth to produce the Doppler shift frequencies. GRA

N75-30559# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MEASUREMENT OF THE INTENSITY OF A VACUUM ULTRAVIOLET SOURCE FOR APPLICATION TO PHOTOIONIZATION IN TEA LASERS M.S. Thesis
Arthur B. Lewis Mar. 1975 54 p refs
(AD-A009209; GEP/PH/75-9) Avail: NTIS CSCL 20/5

Other investigators have demonstrated improved stability and power output in TEA lasers by supplying high background electron densities prior to application of the primary discharge. This background ionization has been achieved in experimental lasers with electron beam techniques or spark discharges. Another approach to supplying the background electron density is the use of the Lyman-alpha line of hydrogen to photoionize nitric oxide which may exist naturally in small quantities in the carbon dioxide laser. Photo intensity measurements for a Hinteregger-type capillary discharge lamp are made with a Samson-type double ionization chamber and values greater than 10 to the 14th power photon/steradian-second are obtained. A photon flux of this magnitude can produce 10 to the 8th power electrons/cc at a depth of 30 cm in a one atmosphere carbon dioxide laser with a CO2:N2:He mixture of 1:2:3. GRA

N75-30560# Stanford Research Inst., Menlo Park, Calif.
HIGH-ENERGY VISIBLE AND ULTRAVIOLET LASERS
C. G. Callan, Jr., R. L. Carman, J. I. Katz, P. L. Kelly, and N. M. Kroll Mar. 1975 113 p refs
(Contract DAHC15-73-C-0370; ARPA Order 2504; SRI Proj. 3000)
(AD-A009227; SRI-JSR-74-1) Avail: NTIS CSCL 20/5

An evaluation was made of current and proposed research efforts directed at realizing high-energy lasers in the visible and UV spectral regions as well as related areas such as X-ray generation, photochemistry, and isotope separation. The scientific issues relevant to the development of high-energy lasers (HELS) operating on electronic transitions in the visible and near-UV portion of the spectrum are analyzed. It was, found that the realization of these goals depends strongly on, and is limited by, knowledge concerning atomic and molecular phenomena that is currently not available. Topics discussed include electronic energy transfer and collisional systems, chemical processes, nonlinear radiative extraction, solid-state, semiconductor, and dye laser systems, multiple-infrared-photon processes, isotope separatison and selective photochemical processes, X-ray and gamma ray lasers, free electron lasers, and conclusions and recommendations. Author

N75-30561# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ACOUSTO-OPTIC BEAM SAMPLER. PART 3: DIFFRACTION EXPERIMENTS AT 10.6 MICROMETERS Final Report
Konrad Frank and Peter F. Klon Mar. 1975 37 p refs
(DA Proj. 1T1-61102-A-33E)
(AD-A009070; BRL-1770) Avail: NTIS CSCL 20/6

This report deals with the results of acousto-optic diffraction experiments in air at 10.6 micron. The laser used for the experiments was operated in a single mode and also a multi-mode configuration with output powers between 1 to 35 watt. A simple Lead-Tin-Telluride detector was used to observe the beam diffracted by ultrasonic acoustic fields. Typical results are presented to illustrate the diffraction by standing and by progressive acoustic fields. Detailed experiments were performed to investigate the dependence of the acousto-optic diffraction on incident laser power, acoustic drive voltage and angle of incidence. GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-30562* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LUBRICATED JOURNAL BEARING Patent
Fredrick T. Schuller and Warren A. Moore, inventors (to NASA) Issued 12 Aug. 1975 7 p Filed 11 Oct. 1973 Supersedes N74-10475 (12 - 01, p 0060)
(NASA-Case-LEW-11076-3; US-Patent-3,899,224; US-Patent-Appl-SN-405346; US-Patent-Class-308-121; US-Patent-Class-308-73) Avail: US Patent Office CSCL 13I

A plurality of bearing sectors are secured to a housing. Each sector comprises a pad mounted on a base. A stiff pad may be

flexibly mounted while a flexible pad may be rigidly mounted.
Official Gazette of the U.S. Patent Office

N75-30563# Royal Aircraft Establishment, Farnborough (England).
NOTES ON EUROMECH 34 ON CONTROL AND FEEDBACK MECHANISMS IN FLOW NOISE, GOETTINGEN OCTOBER 1972
E. G. Broadbent Feb. 1973 37 p refs
(RAE-TM-AERO-1484; BR35634) Avail: NTIS HC $3.75

Papers presented at the conference are discussed. Topics discussed include: noise in ducts and cavities and wind-tunnel noise; shear layers including free jets and shear layers formed downstream of a splitter plate with reference to the Kutta condition; sound production arising from the interaction of flows with moving surfaces; and interaction of sound with turbulence.
Author

N75-30564*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIFE ANALYSIS OF HELICAL GEAR SETS USING LUNDBERG-PALMGREN THEORY
John J. Coy and Erwin V. Zaretsky Washington Aug. 1975 34 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Cleveland
(NASA-TN-D-8045; E-8283) Avail: NTIS HC $3.75 CSCL 13I

A mathematical model is developed for surface fatigue life of helical gears. The expected fatigue life of a pinion, gear, or gear set may be calculated from the model. An equation for the dynamic capacity of a gear set was also derived. Dynamic capacity is the transmitted tangential load which gives a 90 percent probability of survival of the gear set for one million pinion revolutions. The equations, when simplified by setting the helix angle to zero, reduce to the results which were previously developed for spur gears. A sample calculation is given which illustrates the use of the new fatigue life model. Author

N75-30565*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ISOTHERMAL ELASTOHYDRODYNAMIC LUBRICATION OF POINT CONTACTS. 1: THEORETICAL FORMULATION
Bernard J. Hamrock and Duncan Dowson (Leeds Univ.) Washington Aug. 1975 31 p refs
(NASA-TN-D-8049; E-8295) Avail: NTIS HC $3.75 CSCL 11H

The isothermal elastohydrodynamic lubrication (EHL) of a point contact was analyzed numerically by simultaneously solving the elasticity and Reynolds equations. In the elasticity analysis the contact zone was divided into equal rectangular areas, and it was assumed that a uniform pressure was applied over each area. In the numerical analysis of the Reynolds equation, a phi analysis (where phi is equal to the pressure times the film thickness of the 3/2 power) was used to help the relaxation process. The EHL point contact analysis is applicable for the entire range of elliptical parameters and is valid for any combination of rolling and sliding within the contact. Author

N75-30566*# Mechanical Technology, Inc., Latham, N.Y.
FLEXIBLE ROTOR BALANCING BY THE INFLUENCE COEFFICIENT METHOD: MULTIPLE CRITICAL SPEEDS WITH RIGID OR FLEXIBLE SUPPORTS Final Report
Juergen M. Tessarzik Washington NASA Aug. 1975 130 p refs
(Contract NAS3-14420)
(NASA-CR-2553; MTI-75TR3) Avail: NTIS HC $5.75 CSCL 13H

Experimental tests were conducted to demonstrate the ability of the influence coefficient method to achieve precise balance of flexible rotors of virtually any design for operation through virtually any speed range. Various practical aspects of flexible-rotor balancing were investigated. Tests were made on a laboratory quality machine having a 122 cm (48 in.) long rotor weighing 50 kg (110 lb) and covering a speed range up to 18000 rpm. The balancing method was in every instance effective, practical, and economical and permitted safe rotor operation over the full speed range covering four rotor bending critical speeds. Improved correction weight removal methods for rotor balancing were investigated. Material removal from a rotating disk was demonstrated through application of a commercially available laser.
Author

N75-30567# Royal Aircraft Establishment, Farnborough (England).
THE EFFICIENCY OF GENERATORS OF HARMONIC GEAR TRANSMISSIONS
V. A. Finogenov Apr. 1975 9 p refs Transl. into ENGLISH from Izv. Vyssh. Uchebn. Zaved., Mashinostr. (Moscow), v. 6, 1972 p 45-48
(RAE-Lib-Trans-1837; BR48030) Avail: NTIS HC $3.25

A formula is derived for calculating the efficiency of generators of harmonic gear transmissions, and the magnitudes of the effective coefficients of friction which were obtained during the experimental investigation are given. Author

N75-30568*# Scientific Translation Service, Santa Barbara, Calif.
MECHANICS OF MACHINES
I. I. Artobolevskiy Washington NASA Aug. 1975 303 p refs Transl. into ENGLISH of the book "Mekhanika Mashin" Moscow, Nauka Press, 1972 p 1-168
(Contract NASw-2483)
(NASA-TT-F-16568) Avail: NTIS HC $9.25 CSCL 13I

Reports given at a symposium on the theory and geometry of three-dimensional gearings as well as reports presented at a seminar on the theory of mechanisms and machines are discussed. The results are given of research on the development of general methods of gearing theory, the synthesis of methods, and an analysis of existing forms of three-dimensional gear drives. Several studies devoted to the dynamics of different machines and mechanisms are reviewed. Author

N75-30569*# Kanner (Leo) Associates, Redwood City, Calif.
ELECTRON MICROSCOPE SURFACE EXAMINATION OF THE MECHANISMS OF WEAR OF SPECIMENS FROM TESTS WITH OILS CONTAINING SULFUR
J. Wagner, E. Eberhardt, and R. Buechner Washington NASA Aug. 1975 14 p refs Transl. into ENGLISH from Schmierungstechnik (West Germany), 5/2, Feb. 1974 p 46-51
(Contract NASw-2790)
(NASA-TT-F-19526) Avail: NTIS HC $3.25 CSCL 11H

Surfaces were studied before and after wear processes with an emission electron microscope; the chemical composition of the surface layers of the wear samples was determined with an electron beam microprobe. The tests were performed with a gear rig test stand and a four-bearing device using primary oil (viscosity 60cs/50 C) and primary oil mixed with 2.7 mass-% dimethyldisulfide. It is shown that wear phenomena occurring in the microregion of the two specimens types have the same causes and follow the same regularities. Author

N75-30570*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
THE 9TH AEROSPACE MECHANISMS SYMPOSIUM
Washington Aug. 1975 387 p refs Symp. held at Cocoa Beach, Fla., 17-18 Oct. 1974
(NASA-TM-X-3274) Avail: NTIS HC $10.25 CSCL 13I

The successes and failures in the design and development of a variety of mechanisms for space and aeronautical research programs is presented. Emphasis was given to aerospace mechanisms which were either flight qualified or flight demonstrated. Some topics considered are: (1) aerospace medicine and life support systems; (2) servomechanisms; (3) aerospace lubrication technology and its industrial application; and (4) the Skylab Parasol. Photographs are included. Author

N75-30571# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
THE HYDRODYNAMICS OF A PLUG BEARING
I. Etsion and O. Pinkus Jul. 1974 62 p refs
(TAE-217) Avail: NTIS HC $4.25

The notion of a 'plug' bearing refers to bodies moving within tight circular conduits. The hydrodynamic film was investigated which was generated in the narrow interspace between body and wall under conditions of an incompressible fluid and unequal upstream and downstream boundary pressures. Performance characteristics are given for frustums both diverging and

converging in the direction of motion. It is shown that for a given body shape the amount of leakage past the plug is the same regardless of its orientation, but that with geometries whose film increases in the direction of plug velocity, there is a wide range of parameters when the resultant force is such as to drive the body against the wall of the conduit. Over the same range a diverging shape produces a positive floating force.
Author

N75-30572# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
MEASUREMENT AND OCTAVE SPECTRA OF MECHANICAL VIBRATION IN ACCELERATION AND DISPLACEMENT AND OF NOISE PRODUCED BY AIR CONDITIONING EQUIPMENT INSTALLATION
L. X. Nepomuceno 2 Dec. 1974 17 p In PORTUGUESE; ENGLISH summary
(TR-7412.745) Avail: NTIS HC $3.25

The installation, indicating the measurement spots for acceleration, displacement and noise level measurement, and octave band analysis are described. The results are presented in graphs. The maximum permissible levels are compared with the actual ones. Author

N75-30573# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF WELDMENTS IN HIGH PRESSURE VESSEL
L. X. Nepomuceno and E. S. Castillo Barrios 3 Feb. 1975 5 p In PORTUGUESE; ENGLISH summary
(Rept-7502.762) Avail: NTIS HC $3.25

The results of ultrasonic weldment inspection for high pressure vessels are presented. Schematics are included that show the location of the defects. Author

N75-30574# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
A NON-LINEAR-ph METHOD OF SOLUTION FOR JOURNAL GAS BEARINGS
M. J. Cohen Nov. 1974 31 p refs
(TAE-234) Avail: NTIS HC $3.75

A method of solving the Reynolds equations governing the fluid motion in an infinite journal gas bearing was described. The method was derived from an exact transformation of the classical equations to a quasilinear form. The only assumption made is the isothermal one which in practice closely describes the changes in the state of the gas within the bearing. The solution to the transformed equation for ph is sought in series and there are no difficulties in taking more terms into considerations, apart from algebraic ones. A first order solution is immediately obtained and corresponds as an approximation to any of the following methods: small peturbations and a higher order solution is also presented which requires little more algebra for its derivation. The extension of the method to three-dimensional gas journal bearings is also outlined. Author

N75-30575# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
THE GAS PLUG BEARING
I. Etsion and O. Pinkus Jul. 1974 25 p ref
(TAE-218) Avail: NTIS HC $3.25

Hydrodynamic gas films were investigated which are generated between bodies moving within tight circular tubes, with unequal upstream and downstream boundary pressures. Rotation as well as translation is considered. Frustums and stepped configurations were examined, which are either diverging or converging in the direction of motion. It is shown that with converging shapes the direction of the resultant force is such that the body is driven against the wall of the conduit. In diverging shapes a positive floating force is generated. This combined with a superior sealing ability, makes shape divergence a required condition for the successful operation of 'plug' bearings. Author

N75-30576# Southwest Research Inst., San Antonio, Tex.
ANALYSIS OF FILM THICKNESS EFFECT IN SLOW-SPEED LIGHTLY-LOADED ELASTO-HYDRODYNAMIC CONTACTS. PART 1: DEVELOPMENT OF FILM THICKNESS MEASUREMENT TECHNIQUE Final Report, 15 Jun. 1973 - 30 Jun. 1974
J. C. Tyler, H. J. Carper, R. D. Brown, and P. M. Ku Dec. 1974 94 p refs
(Contract F33615-73-C-5123; AF Proj. 7343)
(AD-A005726; SwRI-RS-615-Pt-1; AFML-TR-74-189-Pt-1)
Avail: NTIS CSCL 11/8

The report presents a summary of the first year's effort in a two-year program to study the influence of the oil film thickness on lubricant film behavior and bearing-lubricant life expectancy in despin mechanical assembly-type bearings operating in vacuum. Experimental and analytical work that has been performed on the development of a technique to measure the oil film thickness in an actual bearing operating in vacuum is described. GRA

N75-30577# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
MECHANISMS OF ADHESION FAILURE BETWEEN POLYMERS AND METALLIC SUBSTRATES: ALUMINUM 22024-T3 AND TITANIUM 6 Al-4V WITH HT424 ADHESIVE Final Report, 1 Jun. 1972 - 1 Feb. 1974
Tennyson Smith and D. H. Kaelble Jun. 1974 240 p *refs*
(Contract F33615-72-C-1641; AF Proj. 7342)
(AD-A008777; SC534.23FR; AFML-TR-74-73) Avail: NTIS CSCL 13/5

The report describes a study of aluminum 2024-T3 alloy and titanium 6Al-4V alloy adherends, adhesively bonded with an epoxy HT424 adhesive. The adherend surface properties, after standard surface preparation treatments, were characterized with a number of surface tools. A study of bond strengths after adherend aging and bond aging in humidity chambers has been correlated with surface character. Comparison of surface character with bond failure has revealed probable failure mechanisms. It is demonstrated that mapping of surface prior to bonding can reveal areas that will have a predisposition to fail interfacially and how the mapping technique can be used as an nondestructive testing (NDT) tool for monitoring surfaces. GRA

N75-30578# Mechanics Research, Inc., Los Angeles, Calif.
RAPID SHUTDOWN OF FAILED PIPELINE SYSTEMS AND LIMITING OF PRESSURE TO PREVENT PIPELINE FAILURE DUE TO OVERPRESSURE. PART 1: FINAL TECHNICAL REPORT Final Report
D. L. Platus, D. W. MacKenzie, and C. P. Morse 31 Oct. 1974 225 p *refs* Sponsored by DOT
(PB-241325/0; MRI-2628-TR1; DOT-OPS-75-02) Avail: NTIS HC $7.25; HC also available in a set of 2 reports as PB-241324-SET $16.00 CSCL 13L

The state-of-the-art was determined for rapid shutdown of failed pipeline systems, and limiting of pressure to prevent failure. Liquid pipelines, gas transmission lines, and gas distribution systems were studied. Information was obtained from a comprehensive questionnaire survey of the industry, a literature search, and other sources. The effectiveness of rapid shutdown in reducing accident effects was determined from analysis of historical accident data and analysis of the sequence of events between failure and shutdown. Costs of implementing rapid shutdown and resulting benefits were estimated. Feasibility of a liquid spillage limitation, and relative risks in rapid shutdown vs. continued operation of a failed gas distribution facility were investigated. Rapid shutdown equipment which is technically and economically feasible is identified. GRA

N75-30579# Mechanics Research, Inc., Los Angeles, Calif.
RAPID SHUTDOWN OF FAILED PIPELINE SYSTEMS AND LIMITING OF PRESSURE TO PREVENT PIPELINE FAILURE DUE TO OVERPRESSURE. PART 2: INDUSTRY SURVEY REPORT Final Report
D. L. Platus, C. P. Morse, and J. Fukuzawa 31 Oct. 1974 410 p refs Sponsored by DOT
(PB-241326/8; MRI-2628-TR2; DOT-OPS-75-03) Avail: NTIS HC $10.50; HC also available in a set of 2 reports as PB-241324-SET $16.00 CSCL 13L

The report covers the industry survey portion of a study to determine the state-of-the-art for rapid shutdown of failed pipeline systems, and limiting of pressure to prevent failure due to overpressure. Technical summaries of shut-down and pressure limiting systems and components were prepared. These cover current shutdown and pressure limiting practices by the industry (frequency of use of various methods and equipment), and technical descriptions and analyses of typical systems and

components. Promising rapid shutdown equipment was identified and detailed summaries and analyses were prepared, including operator and carrier experience, performance and reliability data, advantages, disadvantages, manufacturers, and costs. GRA

N75-30580# Army Natick Labs., Mass.
ACQUISITION OF CLIMATIC DATA DURING TRANSPORTATION AND STORAGE OF CONTAINERS Technical Report, Apr. 1971 - Jul. 1973
Franklin D. Barca Apr. 1975 37 p refs
(DA Proj. 1T7-62713-D-552)
(AD-A008958; USA-NLABS-TR-75-78-AMEL) Avail: NTIS CSCL 13/4

The purpose of the studies was to collect data on the conditions of temperature and humidity inside of various containers during shipment and/or storage. The information collected was used as an indication of the effectiveness of the packaging against the environment and as a guide to improved packaging methods. The data were collected with a small, portable, battery operated temperature/humidity recorder placed inside the various containers under study. GRA

N75-30581# Naval Civil Engineering Lab., Port Hueneme, Calif.
AN EVALUATION OF AIR BEARING SYSTEMS FOR CARGO MOVEMENT IN MARINE CORPS SUPPLY Report for Jun. 1973 - Jun. 1974
M. J. Wolfe Mar. 1975 75 p ref
(YF53531104)
(AD-A009248; CEL-TN-1385) Avail: NTIS CSCL 13/9

The Civil Engineering Laboratory (CEL) investigated the operating characteristics of air bearing devices to establish whether they can be profitably incorporated into the Marine Corps logistics system. Representative air bearing devices were experimented with over a variety of surfaces. From the tests it was concluded that virtually any surface not already suitable for air bearing operation can be made so without difficulty. However, bearing devices cannot operate in rough terrain. GRA

N75-30335 Welding Inst., Cambridge (England).
MATERIAL AND STRUCTURAL PROBLEMS IN OFFSHORE INSTALLATIONS
J. G. Hicks *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 1-9 refs (For availability see N75-30334 21-31)
Copyright.

N75-30336 Shell Oil Co., New Orleans, La.
GENERAL CONSIDERATIONS FOR TUBULAR JOINT DESIGN
P. W. Marshall *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 10-34 refs (For availability see N75-30334 21-31)
Copyright.

N75-30337 Welding Inst., Cambridge (England).
FATIGUE DATA INTERPRETATION AND THE RELEVANCE OF CORROSION EFFECTS
B. Tomkins (United Kingdom Atomic Energy Authority) *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 35-45 refs (For availability see N75-30334 21-31)
Copyright.

N75-30338 Osaka Univ. (Japan). Dept. of Welding Engineering.
CORROSION FATIGUE PROPERTIES OF STRUCTURAL STEEL AND ITS WELDED JOINTS IN SEA WATER-PROPERTIES UNDER HIGH AMPLITUDE AND SLOW RATE OF CYCLIC STRESSING
M. Watanabe and Y. Mukai *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 46-53 refs (For availability see N75-30334 21-31)
Copyright.

N75-30345 Welding Inst., Cambridge (England).
MANUAL AND AUTOMATIC WELDING CONSUMABLES FOR USE ON OFFSHORE CONSTRUCTIONS
H. C. Buckingham (BOC-MUREX Welding Res. and Develop. Labs.), P. R. Kemp (BOC-MUREX Welding Res. and Develop. Labs.), and M. Penson (BOC-MUREX Welding Res. and Develop. Labs.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 123-137 refs (For availability see N75-30334 21-31)
Copyright.

N75-30346 Welding Industries, Zurich (Switzerland).
FACTORS AFFECTING THE PROPERTIES OF SUBMERGED-ARC WELD METAL IN 60mm THICK BS 4360: 1968, GRADES 50D AND 55E STEEL
H. D. Baach and P. Colvin (Oerlikon Electrodes, Ltd., Engl.) *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 138-146 (For availability see N75-30334 21-31)
Copyright.

N75-30347 Whessoe Ltd., Darlington (England).
CONTROLLING WELD METAL TOUGHNESS IN MANUAL METAL-ARC WELDS
S. Nicholson and P. F. Rogers *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 147-166 refs (For availability see N75-30334 21-31)
Copyright.

N75-30348 British Steel Corp., London (England). Welding Group.
DEVELOPMENT OF AUTOMATIC WELDING PROCEDURES TO MEET TOUGHNESS REQUIREMENTS FOR OFFSHORE STRUCTURES
A. Clark, M. J. George, and P. R. Kirkwood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 167-177 refs (For availability see N75-30334 21-31)
Copyright.

N75-30351 International Combustion Ltd., London (England).
THE FABRICATION OF DECK NODES FOR NORTH SEA OIL DRILLING RIGS
O. K. Gorton, A. E. Allsop, and K. H. Wood *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1975 p 195-204 (For availability see N75-30334 21-31)
Copyright.

N75-30353 Welding Inst., Cambridge (England).
THE APPLICATION OF MULTIOPERATOR REMOTE CONTROL WELDING EQUIPMENT
J. P. Bevan *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 214-216 (For availability see N75-30334 21-31)
Copyright. Avail: NTIS

N75-30354 E.O. Paton Electric Welding Inst., Kiev (USSR).
UNDERWATER WELDING OF METALS
I. M. Savitch *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1975 p 217-220 (For availability see N75-30334 21-31)
Copyright.

N75-30356 Welding Inst., Cambridge (England).
EXPLOSIVE WELDING IN PIPELINE OPERATIONS. PART 1: APPLICATION OF EXPLOSIVE IN OFFSHORE OPERATIONS
T. J. Corbishley *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 228-238 refs (For availability see N75-30334 21-31)
Copyright.

N75-30357 Welding Inst., Cambridge (England).
CHOOSING CONSUMABLES AND WELDING PROCEDURES TO ENSURE STRONG, TOUGH WELDED STRUCTURES
W. H. Winn (Naval Construction Res. Establ.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 243-249 (For availability see N75-30334 21-31)
Copyright.

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N75-30582# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF CAST STEEL PARTS DESIGNED TO GEAR MACHINING
L. X. Nepomuceno and E. S. Castillo Barrios 19 May 1975 8 p In PORTUGUESE; ENGLISH summary
(Rept-7505.787) Avail: NTIS HC $3.25

The inspected parts, equipment, and procedure are described. The results are presented in schematics, which show the position of the defects. Photos of the observed echograms are also included. Author

N75-30583# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF THE WELDMENTS OF EQUIPMENT INSTALLED IN HYDROELECTRIC POWER PLANT
L. X. Nepomuceno and E. S. Castillo Barrios 23 Jun. 1975 12 p In PORTUGUESE; ENGLISH summary
(Rept-7506.795) Avail: NTIS HC $3.25

The results of the ultrasonic inspection are presented. Schematics are included which indicate the location of the defects. Author

N75-30584# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION AND CONTROL OF CAST STEEL GEARS
L. X. Nepomuceno and E. S. Castillo Barrios 28 May 1975 14 p In PORTUGUESE; ENGLISH summary
(TR-7505.790) Avail: NTIS

The inspected gears and wheels are described. Schematics are presented showing the defect positions. Photos of the observed echograms in each defects are included. Author

N75-30585# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ACCELERATION AND SOUND ATTENUATION IN STEEL PLATES BARE AND COVERED WITH SPECIAL DAMPER
L. X. Nepomuceno 5 May 1975 12 p In PORTUGUESE; ENGLISH summary
(Rept-7505.783) Avail: NTIS HC $3.25

The method and equipment, the results observed with vibration, and sound damping in a set of bare steel plates, and damper covered plates are described. The results are presented in graphs, indicating the decay curves for each case. Author

N75-30586# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION OF THE WELDMENTS IN UNDERSEA PROSPECTION PLATFORM
L. X. Nepomuceno and E. S. Castillo Barrios 4 Feb. 1975 21 p In PORTUGUESE; ENGLISH summary
(Rept-7502.763) Avail: NTIS HC $3.25

A schematic is presented of the inspected platforms, indicating the position of each inspected weldment. The results indicate the defect spot. Photos of the observed echograms are included. Author

N75-30587# Stanford Univ., Calif. Dept. of Statistics.
EFFICIENCY-ROBUST ESTIMATION METHODS FOR RELIABILITY Final Report, 1 Oct. 1971 - 30 Sep. 1974
M. Vernon Johns, Jr. 17 Mar. 1975 21 p refs
(Contract F44620-72-C-0012; AF Proj. 9769)
(AD-A008930; AFOSR-75-0595TR) Avail: NTIS CSCL 14/4

A theoretical and empirical study of a class of robust estimators for the median of a symmetric continuous distribution is undertaken; the estimators considered are adoptive linear combinations of averages of two blocks of symmetrically located order statistics. The estimators are shown to be superior in overall performance when compared with previously suggested estimators. An estimator of the variance of the location estimator is also developed and studied as is the studentized version of the location estimator. The problem of estimating quantiles without symmetry assumptions is also discussed. GRA

N75-30588# Army Materiel Command, Texarkana, Tex. Intern Training Center.
SELECTED CONTROL CHART SYSTEMS BASED ON THE REJECT POPULATION Final Report
Louis F. Bernhardt Apr. 1975 113 p refs
(AD-A009204; USAMC-ITC-02-08-75-008) Avail: NTIS CSCL 13/8

Over the years quality control has played an important role in both industry and government. To maintain satisfactory output from a production process, the process is monitored through the construction of control charts. This paper is mainly concerned with one of these charting techniques that is, based on reject or out of control components. This paper develops (X ave), R, and Cusum charts using the reject population, both above and below an upper and lower specification limit. A cost analysis is done to show use of the rejects in (X ave) charting is an economical one. A process has been simulated to analyze the application of the rejects to (X ave), R, and Cusum charts. It was found that, in using unsymmetric specification limits, the reject population provided a more sensitive and economical (X ave) chart. The method also proved useful in Cusum charting, however, further investigation is needed in its application to R charting. GRA

N75-30343 Welding Inst., Cambridge (England). Metallurgical Dept.
THE USE OF SMALL-SCALE DESTRUCTIVE TESTS TO ASSESS SUSCEPTIBILITY TO LAMELLAR TEARING
J. C. M. Farrar, B. J. Ginn, and R. E. Dolby *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 96-113 refs (For availability see N75-30334 21-31)
Copyright.

N75-30350 Welding Inst., Cambridge (England).
THE ROLE OF NON-DESTRUCTIVE TESTING IN THE OFFSHORE OIL AND GAS INDUSTRY
V. A. Peters (Unit Inspection Co.), D. M. Davies (Unit Inspection Co.), and B. G. Hughes (Unit Inspection Co.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1975 p 187-194 (For availability see N75-30334 21-31)
Copyright.

N75-30352 Welding Inst., Cambridge (England).
SOME ASPECTS OF THE WELDING QUALITY CONTROL IN TWO NORTH SEA OFFSHORE DRILLING PLATFORMS
G. A. Alpsten (Industrikontrol AB, Enskede, Sweden) and B. I. B. Hallberg (Industrikontroll AB, Enskede, Sweden) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 205-213 (For availability see N75-30334 21-31)
Copyright.

N75-30355 Welding Inst., Cambridge (England).
A STANDARD FOR EXPLOSIVELY WELDING PIPELINES
B. Phelps (British Gas Corp.) and N. H. Evans (British Gas Corp.) *In its* Welding in Offshore Construct., Vols. 1 and 2 1974 p 221-227 refs (For availability see N75-30334 21-31)
Copyright.

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-30589+ Engineering Sciences Data Unit, London (England).
ESTIMATION OF THE LOCAL BUCKLING STRESS UNDER BIAXIAL COMPRESSION OF AN ISOTROPIC SKIN WITH FIBRE REINFORCED INTEGRAL UNFLANGED STIFFENERS
11 Nov. 1973 4 p Amendment A
(ESDU-73015) Avail: NTIS HC $26.50

A specific example is presented for calculating the local buckling stress of stiffened panels parts or all of which have orthotropic material properties. The data are applicable to struts or panels constructed from, or reinforced by composite materials, such as carbon or glass fiber reinforced plastic, which consist of long fibrous reinforcements in metallic or nonmetallic matrices. Author

N75-30590 British Library Lending Div., Boston Spa (England).
BUCKLING OF CORRUGATED CARDBOARD AND WAYS OF PREVENTING IT

V. A. Filin Apr. 1975 9 p Transl. into ENGLISH from Bun. Prom. (Moscow), v. 4, 1974 p 18-20
(BLL-RTS-9752) Avail: British Library Lending Div., Boston Spa, Engl.: £ L1.40, 2 BLL photocopy coupons

A study is made of the main reasons for the deformation of corrugated cardboard at different stages in its thermal treatment. It was found that the degree of transverse twisting of specimens of corrugated cardboard is directly dependent on the shrinking of the glue layer, and this in turn depends on the drying schedule. The main ways of preventing this phenomenon in commercial production lines are described. Author

N75-30591+ Engineering Sciences Data Unit, London (England).
FLEXIBILITIES OF AND STRESSES IN THIN PIPE BENDS UNDER IN-PLANE BENDING: INFLUENCE OF BEND ANGLE AND TANGENT PIPE ENDS
Aug. 1975 12 p refs Sponsored by Roy. Aeron. Soc. and Inst. of Mech. Engr.
(ESDU-75014) Avail: NTIS HC $74.50

Data on the flexibilities and stresses due to in-plane bending in thin pipe bends of any bend angle having tangent pipe end connections are provided for use in strength analysis of bends in pneumatic, hydraulic, and chemical plant piping systems. The data are applicable to the elastic analysis of thin pipes of radius to thickness ratio greater than 10 with bend radius greater than twice the pipe radius, under in-plane bending moment tending to open or close the bend. Author

N75-30592+ Institut Superieur d'Electronique du Nord, Lille (France). Lab. d'Ultrasons.
PRODUCTION OF RAYLEIGH WAVES IN NON-PIEZOELECTRIC MATERIALS AND APPLICATION TO THE STUDY AND DETECTION OF FAULTS DUE TO MATERIALS FATIGUE Final Report [PRODUCTION DES ONDES DE RAYLEIGH SUR DES MATERIAUX NON PIEZOELECTRIQUES ET APPLICATION A L'ETUDE AT A LA DETECTION DES DEFAUTS DUS A LA FATIGUE DES MATERIAUX]
J. Pouliquen, G. Leman, and A. Defebvre [1974] 24 p refs In FRENCH; ENGLISH summary
(Contract DGRST-73-7-1115)
Avail: NTIS HC $3.25

A feedback method using surface waves transferred on steel by a durable and efficient method is described. The method is applied to study microdeformations (lengthening, strain) fatigue caused by cyclic loads corrosion and surface state. The significant parameters of fatigue and corrosion were measured. Precursor signs of fatigue before the appearance of cracks were detected. ESRO

N75-30593# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
FRETTING AND FATIGUE OF PIN-LOADED LUGS UNDER COMPLEX LOADS
H. P. VanLeeuwen, A. Nederveen, and H. H. Ruiter Sep. 1973 12 p ref
(NLR-TR-73127-U) Avail: NTIS HC $3.25

Pin loaded, loosely fitting lugs of 2024-T3 aluminum alloy were tested at a low frequency fatigue load with a high-frequency low-amplitude sinusoidal load superimposed. The effects of the amplitude of the high frequency load, clamping pressure, and a special anti-fret coating were investigated. Author

N75-30594# Technische Hogeschool, Delft (Netherlands). Dept. of Aeronautical Engineering.
FATIGUE CRACK GROWTH UNDER VARIABLE-AMPLITUDE LOADING
J. Schijve Apr. 1974 18 p refs Presented at Conf. on the Prospects of Advanced Fracture Mechanics, Delft, Netherlands, 24-28 Jun. 1974
(VTH-181) Avail: NTIS HC $3.25

A description is given of fatigue damage, including the amount of cracking, crack front orientation, crack tip blunting, crack closure, and cyclic-strain hardening in the crack tip zone. Examples of interaction effects during variable-amplitude loading are included. The usefulness and limitations of the stress intensity factor for stationary variable-amplitude loading are considered. Recent models for crack growth are surveyed. Requirements and a framework for a new model, accounting for observed interaction mechanisms, are presented. Author

N75-30595*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DESIGN OF STRUCTURES FOR OPTIMUM GEOMETRY
Garret N. VanDerPlaats Aug. 1975 12 p refs
(NASA-TM-X-62462; A-6204) Avail: NTIS HC $3.25 CSCL 20K

A method is presented for configuration optimization of finite element structures, given a reasonable initial geometry. The objective is to minimize weight or cost. Design variables include geometric as well as member sizing parameters. The number of elements and joints, and the element-joint relationships are prescribed and are not changed during the optimization process. However, the joint locations are changed. The structure is assumed to be linearly elastic and may be statically indeterminate. Multiple loading conditions are allowed. Constraints include limits on stiffness as well as strength. The method is demonstrated with application to truss design, subject to minimum size, strength, buckling, and displacement constraints. Major design improvements are achieved through configurations changes. Author

N75-30596*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AN IMPROVED METHOD FOR OPTIMUM DESIGN OF MECHANICALLY AND THERMALLY LOADED STRUCTURES
Howard M. Adelman, Joanne L. Walsh, and R. Narayanaswami Washington Aug. 1975 35 p refs
(NASA-TN-D-7965; L-10161) Avail: NTIS HC $3.75 CSCL 20K

The problem of obtaining the minimum-mass design of mechanically and thermally loaded structures is presented. The special nature of thermal stresses with regard to their response to resizing of structural members is discussed. It is shown that conventional resizing procedures which are based on driving the total stress to its allowable value may be inefficient when the thermal stress in an element makes up a significant fraction of the total stress. An improved algorithm for resizing of structures subjected to thermal stresses is treated. In this algorithm the mechanical portions of the stresses were driven to their maximum allowable values. The thermal stresses were used to adjust the allowable values of the mechanical stresses. The new algorithm was exercised for a number of truss structures of varying complexity and compared with ordinary fully stressed design. Author

N75-30597# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
AN ELASTIC PLASTIC FORMULATION FOR A CYLINDRICAL SHELL FINITE ELEMENT
Roger J. Wagner and T. Y. Yang 19 Aug. 1975 39 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Dec. 1975
Avail: NTIS HC $3.75

An elastic-plastic formulation is presented for a curved rectangular thin shell finite element. Elastic-perfectly plastic material behavior is assumed, and the von Mises yield criterion was used to define the limit of plasticity. Initial (plastic) strain distributions and a distribution for an elastic-plastic boundary in the element are defined. Incremental stress-strain relations were developed for use in the plastic range, and by using this formulation and an incremental approach, yielding may be traced in a deforming shell system. Displacements, stresses, strains, forces, and moments were determined for each increment of load; a load-displacement path is found to be predictable in the plastic range. The formulation and analysis procedure are evaluated by examples. Author

N75-30598*# Grumman Aerospace Corp., Bethpage, N.Y.
NUMERICAL NONLINEAR INELASTIC ANALYSIS OF STIFFENED SHELLS OF REVOLUTION. VOLUME 2: USER'S MANUAL FOR STARS-2P DIGITAL COMPUTER PROGRAM
V. Svalbonas and H. Levine Washington NASA Jul. 1975 167 p refs
(Contract NAS8-28569)

(NASA-CR-2559-Vol-2; M142) Avail: NTIS HC $6.25 CSCL 20K

The information necessary for application of the STARS-2P (shell theory automated for rotational structures-2(plasticity)) program is presented. This addition to the STARS system of programs retains the basic fractures characteristic of the system. For vol. 1, see N75-27419. Author

N75-30599*# Grumman Aerospace Corp., Bethpage, N.Y.
NUMERICAL NONLINEAR INELASTIC ANALYSIS OF STIFFENED SHELLS OF REVOLUTION. VOLUME 3: ENGINEER'S PROGRAM MANUAL FOR STARS-2P DIGITAL COMPUTER PROGRAM
V. Svalbonas, H. Levine, and P. Ogilvie Washington NASA Jul. 1975 207 p refs
(Contract NAS8-28569)
(NASA-CR-2559-Vol-3; M142) Avail: NTIS HC $7.25 CSCL 20K

Engineering programming information is presented for the STARS-2P (shell theory automated for rotational structures-2P (plasticity)) digital computer program, and FORTRAN 4 was used in writing the various subroutines. The execution of this program requires the use of thirteen temporary storage units. The program was initially written and debugged on the IBM 370-165 computer and converted to the UNIVAC 1108 computer, where it utilizes approximately 60,000 words of core. Only basic FORTRAN library routines are required by the program: sine, cosine, absolute value, and square root. Author

N75-30600*# Grumman Aerospace Corp., Bethpage, N.Y.
NUMERICAL NONLINEAR INELASTIC ANALYSIS OF STIFFENED SHELLS OF REVOLUTION. VOLUME 4: SATELLITE-1P PROGRAM FOR STARS-2P DIGITAL COMPUTER PROGRAM
V. Svalbonas and P. Ogilvie Washington NASA Jul. 1975 51 p refs
(Contract NAS8-28569)
(NASA-CR-2559-Vol-4; M142) Avail: NTIS HC $4.25 CSCL 20K

A special data debugging package called SAT-1P created for the STARS-2P computer program is described. The program was written exclusively in FORTRAN 4 for the IBM 370-165 computer, and then converted to the UNIVAC 1108. Author

N75-30601# Indian Inst. of Science, Bangalore.
ACCURATE DETERMINATION OF STRESS CONCENTRATIONS AROUND ELLIPTICAL HOLES IN CYLINDRICAL SHELLS
M. V. V. Murthy, K. P. Rao, and A. K. Rao 14 Sep. 1973 13 p refs Presented at 2d Intern. Conf. on Struct. Mech. in Reactor Tech., Berlin, 10-14 Sep. 1973
Avail: NTIS HC $3.25

The problem of stress concentrations around cutouts in thin shell structures is of importance in reactor pressure vessels. A theoretical analysis is presented for evaluating stresses around an elliptical hole in a cylindrical shell under axial tension with the major axis of the hole parallel to shell axis. Solution for the Donnell equations for a circular cylindrical shell is expressed in elliptic coordinates as an infinite series in terms of Mathieu and modified Mathieu functions by the method of separation of variables. The solution is then reduced to a Fourier series and the boundary conditions are satisfied numerically term by term in the Fourier series. An earlier analysis by Venkitapathy for the same problem is found to be erroneous due to the omission of a part of the series solution. A chart is presented from which the stress concentration factor can be directly read over the range of values of k and beta mentioned. A feature of the problem is that for each value of k, there exists a certain value of curvature parameter beta at which the usual series solutions become numerically unstable, because the Mathieu equation has an infinite number of branching points on the complex plane. Author

N75-30602# Indian Inst. of Science, Bangalore.
STRESS CONCENTRATIONS AROUND PLAIN AND REINFORCED HOLES IN CYLINDRICAL AND SPHERICAL SHELLS
K. P. Rao and P. Prakash 14 Sep. 1973 14 p refs Presented at 2d Intern. Conf. on Struct. Mech. in Reactor Technol., Berlin, 10-14 Sep. 1973
Avail: NTIS HC $3.25

A procedure is presented for the stress analysis of pressurized cylindrical and spherical shells containing curvilinear holes valid also for beta greater than 1. The two shapes of holes considered are elliptical and square holes with rounded corners. Stresses and displacements at any point in the shell were obtained as a superposition of the stresses due to a circular hole and the perturbation stresses due to departure of the given contour from a circle. Only the first order perturbation is considered. Author

N75-30603*# Boeing Co., Seattle, Wash. Research and Engineering Div.
ADVANCED BEADED AND TUBULAR STRUCTURAL PANELS Final Report
Max D. Musgrove and Bruce E. Greene Washington NASA Sep. 1975 100 p refs
(Contract NAS1-10749)
(NASA-CR-2514) Avail: NTIS HC $4.75 CSCL 20K

A program to develop lightweight beaded and tubular structural panels is described. Applications include external surfaces, where aerodynamically acceptable, and primary structure protected by heat shields. The design configurations were optimized and selected with a computer code which iterates geometric parameters to satisfy strength, stability, and weight constraints. Methods of fabricating these configurations are discussed. Nondestructive testing produced extensive combined compression, shear, and bending test data on local buckling specimens and large panels. The optimized design concepts offer 25 to 30% weight savings compared to conventional stiffened sheet construction. Author

N75-30604*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
FEASIBILITY STUDY FOR THE IMPLEMENTATION OF NASTRAN ON THE ILLIAC 4 PARALLEL PROCESSOR
Eric I. Field [1975] 75 p refs Prepared for Universal Anal., Inc., Playa Del Rey, Calif.
(Contract NAS1-12436)
(NASA-CR-132702) Avail: NTIS HC $4.25 CSCL 20K

The ILLIAC IV, a fourth generation multiprocessor using parallel processing hardware concepts, is operational at Moffett Field, California. Its capability to excell at matrix manipulation, makes the ILLIAC well suited for performing structural analyses using the finite element displacement method. The feasibility of modifying the NASTRAN (NASA structural analysis) computer program to make effective use of the ILLIAC IV was investigated. The characteristics are summarized of the ILLIAC and the ARPANET, a telecommunications network which spans the continent making the ILLIAC accessible to nearly all major industrial centers in the United States. Two distinct approaches are studied: retaining NASTRAN as it now operates on many of the host computers of the ARPANET to process the input and output while using the ILLIAC only for the major computational tasks, and installing NASTRAN to operate entirely in the ILLIAC environment. Though both alternatives offer similar and significant increases in computational speed over modern third generation processors, the full installation of NASTRAN on the ILLIAC is recommended. Specifications are presented for performing that task with manpower estimates and schedules to correspond. Author

N75-30605*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIDE CRACKED PLATED SUBJECT TO COMBINED DIRECT AND BENDING FORCES
John E. Srawley and Bernard Gross 1975 21 p refs Presented at the 9th Symp. on Fracture Mech., Pittsburgh, 25-27 Aug. 1975; sponsored by the Am. Soc. for Testing and Mater.
(NASA-TM-X-71784; E-8446) Avail: NTIS HC $3.25 CSCL 20K

The opening mode stress intensity factor and the associated crack mouth displacement are comprehensively treated using planar boundary collocation results supplemented by end point values from the literature. Data are expressed in terms of dimensionless coefficients of convenient form which are each functions of two dimensionless parameters, the relative crack

length, and a load combination parameter which uniquely characterizes all possible combinations of tension or compression with bending or counterbending. Accurate interpolation expressions are provided which cover the entire ranges of both parameters. Application is limited to specimens with ratios of effective half-height to width not less than unity. Author

N75-30606*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MONITORING CRACK EXTENSION IN FRACTURE TOUGHNESS TESTS BY ULTRASONICS

S. J. Klima, D. M. Fisher, and R. J. Buzzard 1975 28 p refs Proposed for presentation at Natl. Fall Conf. of the Am. Soc. for Nondestructive Testing, Atlanta, 13-16 Oct. 1975

(NASA-TM-X-71754; E-8395) Avail: NTIS HC $3.75 CSCL 20K

An ultrasonic method was used to observe the onset of crack extension and to monitor continued crack growth in fracture toughness specimens during three point bend tests. A 20 MHz transducer was used with commercially available equipment to detect average crack extension less than 0.09 mm. The material tested was a 300-grade maraging steel in the annealed condition. A crack extension resistance curve was developed to demonstrate the usefulness of the ultrasonic method for minimizing the number of tests required to generate such curves. Author

N75-30607# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

INVESTIGATION OF THE MANUFACTURE OF BUILDING MATERIALS BY CARBONATION HARDENING OF SLAKED LIME

O. Matsuda and H. Yamada 1975 26 p refs Transl. into ENGLISH from Sekko to Sekkai (Tokyo), no. 125, 1973 p 170-179

(NRC/CNR-TT-1807; Issn-0470-2557) Avail: NTIS HC $3.75

An investigation was conducted to determine the conditions necessary to produce a durable building material using carbon dioxide issuing from lime-burning kilns. Parameters studied are mix proportions, compaction pressure, temperature, humidity, and addition of different materials. Author

N75-30608# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).

MEASUREMENT OF SOUND AND VIBRATION ATTUENUATION IN STEEL PLATES, BARE AND WITH GLUED DAMPER

L. X. Nepomuceno 1 Mar. 1975 12 p In PORTUGUESE; ENGLISH summary

(Rept-7503.769) Avail: NTIS HC $3.25

The method, equipment, and the results observed with sound and vibration damping measurements are described. The measurements covered a set of bare plates, and plates with damping material. Author

N75-30609# Air Force Materials Lab., Wright-Patterson AFB, Ohio.

SOFT BODY IMPACT DAMAGE EFFECTS ON BORON-ALUMINUM COMPOSITES Technical Report, Aug. 1973 - Mar. 1974

William J. Jaques Jan. 1975 115 p refs

(AF Proj. 7351)

(AD-A008779; AFML-TR-74-155) Avail: NTIS CSCL 11/4

This study investigated the effects of soft body impact damage on the residual tensile and axial fatigue strength of Boron-6061 Aluminum composite material. Unidirectional B-6061 Al specimens were impacted with room temperature vulcanizing rubber (RTV) spheres in a powder charge gun facility. Specimens were also impacted under five different tensile loads. Residual tensile strength versus impact velocity plots were generated for each prestress level. The composite was further characterized by axial fatigue and nondestructive tests. All tests were carried out at room temperature. A similar damage and residual strength analysis was done for Ti-6Al-4V to provide baseline data against which to compare the composite. It was concluded that Ti-6Al-4V is much more resistant to impact damage than unidirectional B-6061 Al. A fracture mechanic analysis is presented and a fracture mechanics model proposed for unidirectional B-6061 Al impacted specimens. GRA

N75-30610# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.

BEHAVIOR OF CANTILEVER BEAM UNDER IMPACT BY A SOFT PROJECTILE Final Report, Jan. - Aug. 1973

Stephen W. Tsai, C. T. Sun, A. K. Hopkins, H. T. Hahn, and T. W. Lee Nov. 1974 77 p refs

(AF Proj. 7340)

(AD-A008778; AFML-TR-74-94) Avail: NTIS CSCL 21/5

In an attempt to determine the maximum deflection and the ultimate strength of a fan blade under the impact of a bird, experiments were performed on the impact of cantilever beams by soft-rubber projectiles. The observed response of the projectile and beam can be correlated with a simple analytic model - an equivalent mass-spring system which is derived from an assumed deflection mode. The initial velocity of the equivalent mass immediately after impact is computed from the momentum conservation principle and measured coefficient of restitution. This information and the dynamic characteristics of the equivalent mass-spring system are shown to be fairly sufficient to predict the behavior of the beam. The success of this model implies that the structural response of fan blades under bird impact can be made predictable. GRA

N75-30611# Air Force Systems Command, Wright-Patterson AFB, Ohio.

THE EXISTENCE AND DIFFERENTIAL PROPERTIES OF THE GENERALIZE SOLUTION OF THE GENERAL PROBLEM FOR AN ELASTIC CYLINDRICAL SHELL IN NONLINEAR SETTING Foreign Technology Div.

G. A. Kosushkin 21 Feb. 1975 30 p refs Transl. into ENGLISH from Uch. Zap. Tsagi (USSR), v. 1, no. 6, 1970 p 91-99

(AD-A008638; FTD-MT-24-0376-75) Avail: NTIS CSCL 20/11

Nonlinear equations of the average mean flexure of an elastic locked circular cylindrical shell are examined along with the load of common form and the arbitary conditions of attachment. A question concerning the degree of smoothness of the generalized solution, depending on the smoothness of the external load, was discussed. Author (GRA)

N75-30612# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.

BUCKLING, PREBUCKLING AND VIBRATION OF STIFFENED AND UNSTIFFENED SHELLS Final Report, 1 Jul. 1974 - 31 Dec. 1974

Josef Singer and Menachem Baruch 10 Feb. 1975 12 p

(Grant AF-AFOSR-2394-72; AF Proj. 9782)

(AD-A008950; AFOSR-75-0400TR) Avail: NTIS CSCL 20/11

This report complements the Interim Report (TAE 228), which summarized the major portion of the investigation. It discusses the stability and vibrations of stiffened and unstiffened shells under axial compression, as well as thermal buckling. The studies include theoretical and experimental work, with emphasis on elastic constraints, on correlation between vibrations and buckling and on the influence of initial imperfections on vibrations and stability. A new incremental theory for the nonlinear elasto-plastic behavior of structures is formulated. GRA

N75-30613# Washington Univ., St. Louis, Mo. Materials Research Lab.

STRENGTH CHARACTERISTICS OF BORON ALUMINUM COMPOSITE SUBJECTED TO COMBINED STRESSES Final Report, 1 Jan. 1973 - 30 Jun. 1974

Rodney L. Thomas Oct. 1974 104 p refs

(Contract F33615-73-C-5026; AF Proj. 7353)

(AD-A008781; AFML-TR-74-214) Avail: NTIS CSCL 11/4

Quasi-static combined stress experiments were performed on 50 v/o unidirectional Al/B Composites. The Failure Tensor Polynomial Criterion correlated the experimentally determined failure surface within empirical accuracy. This program has also shown that the compressive axial strength is significantly greater than the tensile axial strength. Combined axial and shear stress fatigue testing has been demonstrated and the results suggest that Al/B composites have good resistance to combined axial-shear fatigue. Preliminary exploration indicates that the stress path may have a significant influence on strength. Additional work in this area is desirable. GRA

N75-30614# Southern Methodist Univ., Dallas, Tex. Dept. of Civil and Mechanical Engineering.
BUCKLING OF STIFFENED LAMINATED COMPOSITE CIRCULAR CYLINDRICAL SHELLS WITH DIFFERENT MODULI IN TENSION AND COMPRESSION Interim Report
Robert M. Jones and Harold S. Morgan Feb. 1975 92 p refs (Grant AF-AFOSR-2532-73; AF Proj. 9782)
(AD-A008854; AFOSR-75-0547TR) Avail: NTIS CSCL 11/4

An exact buckling criterion, within the framework of classical buckling theory, is derived for eccentrically stiffened multilayered circular cylindrical shells made of materials that have different orthotropic moduli in tension and compression. Such behavior is typical of many current composite materials. The buckling criterion is valid for arbitrary combinations of axial and circumferential loading, including axial compression and internal pressure as well as axial tension and lateral pressure. The material model (stress-strain relationship) is based on a bilinear stress-strain curve with a discontinuity in slope (modulus) at the origin. Numerical results are used to illustrate application of the buckling criterion. In particular, results are given for single-layered isotropic and orthotropic shells with noticeable differences in tensile and compressive moduli. GRA

N75-30083 Stuttgart Univ. (West Germany). Inst. fuer Statik und Dynamik der Luft- und Raumfahrtkonstruktionen.
LARGE NATURAL STRAINS AND SOME SPECIAL DIFFICULTIES DUE TO NONLINEARITY AND INCOMPRESSIBILITY IN FINITE ELEMENTS
J. H. Argyris, P. C. Dunne, T. Angelopoulos, and B. Bichat *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 79 p refs (For availability see N75-30082 21-01)

N75-30339 Shell Exploration and Production Lab., Rijswijk (Netherlands).
STRESS ANALYSIS OF A TURBULAR CROSS-JOINT WITHOUT INTERNAL STIFFENING FOR OFFSHORE STRUCTURES
F. I. A. Brink and A. H. VanderKrogt *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 54-61 refs (For availability see N75-30334 21-31)
Copyright.

N75-30340 Lloyds Register of Shipping, London (England).
DESIGN APPRAISAL OF OFFSHORE PLATFORMS OF WELDED TUBULAR CONSTRUCTION
C. A. Bainbridge and G. P. Smedley *In* Welding Inst. Welding in Offshore Construct., Vols. 1 and 2 1974 p 62-71 refs (For availability see N75-30334 21-31)
Copyright.

42 GEOSCIENCES (GENERAL)

N75-30615*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROCEEDINGS OF THE 1974 LYNDON B. JOHNSON SPACE CENTER WHEAT-YIELD CONFERENCE
David E. Pitts and Gerald L. Barger (Lockheed Electronics Co., Houston, Tex.) Apr. 1975 187 p refs Conf. held at Houston, Tex., 1974
(NASA-TM-X-58158; JSC-09256) Avail: NTIS HC $7.00 CSCL 02C

The proceedings of the 1974 Lyndon B. Johnson Space Center Wheat-Yield Conference are presented. The state of art of wheat-yield forecasting and the feasibility of incorporating remote sensing into this forecasting were discussed with emphasis on formulating common approach to wheat-yield forecasting, primarily using conventional meteorological measurements, which can later include the various applications of remote sensing. Papers are presented which deal with developments in the field of crop modelling. Author

N75-30616# Joint Publications Research Service, Arlington, Va.
SOVIET BLOC RESEARCH IN GEOPHYSICS, ASTRONOMY, AND SPACE, NO. 354
14 Aug. 1975 66 p refs Transl. into ENGLISH from Russian Publications
(JPRS-65461) Avail: NTIS HC $4.25

Translations and abstracts are presented of articles on meteorology, oceanography, upper atmosphere and space research, astronomy and terrestrial geophysics, covering both science news and formal scientific reports. Published details of Soviet space accomplishments are included. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N75-30617*+ National Aeronautics and Space Administration, Washington, D.C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 2
Mar. 1975 140 p refs
(NASA-SP-7041(02)) Avail: NTIS HC $4.00 CSCL 05B

Reports, articles, and other documents announced between April and June 1974 in Scientific and Technical Aerospace Reports (STAR), and International Aerospace Abstracts (IAA) are cited. Documents related to the identification and evaluation by means of sensors in spacecraft and aircraft of vegetation, minerals, and other natural resources, and the techniques and potentialities of surveying and keeping up-to-date inventories of such riches are included along with studies of such natural phenomena as earthquakes, volcanoes, ocean currents, and magnetic fields; and such cultural phenomena as cities, transportation networks, and irrigation systems. The components and use of remote sensing and geophysical instrumentation, their subsystems, observational procedures, signature and analyses and interpretive techniques for gathering data are, described. All reports generated under NASA's Earth Resources Survey Program for the time period covered are included. Author

N75-30618*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report. Aug. 1975
Paul M. Merifield, Principal Investigator 5 Aug. 1975 2 p refs EREP
(Contract NAS2-7968)
(E75-10385; NASA-CR-143291; MPR-26) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-30619*# Geological Survey, Reston, Va.
ION-ABSORPTION BAND ANALYSIS FOR THE DISCRIMINATION OF IRON-RICH ZONES Progress Report, 1 Jul. 1972 - 1 Aug. 1974
Lawrence C. Rowan, Principal Investigator and Pamela H. Wetlaufer 15 Dec. 1974 201 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NASA Order S-70243-AG)
(E75-10380; NASA-CR-143292) Avail: NTIS HC $7.25 CSCL 08G

The author has identified the following significant results. A technique which combines digital computer processing and color composition was devised for detecting hydrothermally altered areas and for discriminating among many rock types in an area in south-central Nevada. Subtle spectral reflectance differences among the rock types are enhanced by ratioing and contrast-stretching MSS radiance values for form ratio images which subsequently are displayed in color-ratio composites. Landform analysis of Nevada shows that linear features compiled without respect to length results in approximately 25 percent coincidence with mapped faults. About 80 percent of the major lineaments

coincides with mapped faults, and substantial extension of locally mapped faults is commonly indicated. Seven major lineament systems appear to be old zones of crustal weakness which have provided preferred conduits for rising magma through periodic reactivation.

N75-30620*# Texas Univ., Austin.
STREAM NETWORK ANALYSIS AND GEOMORPHIC FLOOD PLAIN MAPPING FROM ORBITAL AND SUBORBITAL REMOTE SENSING IMAGERY APPLICATION TO FLOOD HAZARD STUDIES IN CENTRAL TEXAS Final Report
Victor R. Baker, Principal Investigator, Robert K. Holz, Steven D. Hulke, Peter C. Patton, and Margarida M. Penteado 30 Apr. 1975 187 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13312)
(E75-10387; NASA-CR-144354) Avail: NTIS HC $7.00 CSCL 08H

The author has identified the following significant results. Development of a quantitative hydrogeomorphic approach to flood hazard evaluation was hindered by (1) problems of resolution and definition of the morphometric parameters which have hydrologic significance, and (2) mechanical difficulites in creating the necessary volume of data for meaningful analysis. Measures of network resolution such as drainage density and basin Shreve magnitude indicated that large scale topographic maps offered greater resolution than small scale suborbital imagery and orbital imagery. The disparity in network resolution capabilities between orbital and suborbital imagery formats depends on factors such as rock type, vegetation, and land use. The problem of morphometric data analysis was approached by developing a computer-assisted method for network analysis. The system allows rapid identification of network properties which can then be related to measures of flood response.

N75-30621*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Quarterly Progress Report, 31 Oct. 1974 - 31 Jan. 1975
John W. Hannah, Garland L. Thomas (Brevard County Planning Dept., Merritt Island, Fla.), Fernando Esparza, Principal Investigators, and James J. Millard 31 Jan. 1975 10 p EREP
(Contract NASA Order CC-30281-A)
(E75-10388; NASA-TM-X-72453) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-30622*# Pennsylvania State Univ., University Park.
LINEAMENT MAP OF PENNSYLVANIA Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, W. S. Kowalik, and D. P. Gold Jul. 1975 4 p ERTS
(Contract NAS5-23133)
(E75-10389; NASA-CR-143295; ORSER-SSEL-TR-5-75) Avail: NTIS HC $3.25 CSCL 08H

There are no author-identified significant results in this report.

N75-30623*# Pennsylvania State Univ., University Park.
LINEAMENTS AND MINERAL OCCURRENCES IN PENNSYLVANIA Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, W. S. Kowalik, and D. P. Gold Jul. 1975 20 p refs ERTS
(Contracts NAS5-23133; NAS9-13406)
(E75-10390; NASA-CR-143296; ORSER-SSEL-TR-14-75) Avail: NTIS HC $3.25 CSCL 08G

The author has identified the following significant results. A conservative lineament map of Pennsylvania interpreted from ERTS-1 channel 7 (infrared) imagery and Skylab photography was compared with the distribution of known metallic mines and mineral occurrences. Of 383 known mineral occurrences, 116 show a geographical association to 1 km wide lineaments, another 24 lie at the intersection of two lineaments, and one lies at the intersection of three lineaments. The Perkiomen Creek lineament in the Triassic Basin is associated with 9 Cu-Fe occurrences. Six Pb-Zn occurrences are associated with the Tyrone-Mount Union lineament. Thirteen other lineaments are associated with 3, 4, or 5 mineral occurrences each.

N75-30624*# Pennsylvania State Univ., University Park.
COMPARISON OF SKYLAB AND LANDSAT LINEAMENTS WITH JOINT ORIENTATIONS IN NORTHCENTRAL PENNSYLVANIA Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, and W. S. Kowalik Jul. 1975 13 p refs ERTS
(Contracts NAS5-23133; NAS9-13406)
(E75-10391; NASA-CR-143297) Avail: NTIS HC $3.25 CSCL 08G

The author has identified the following significant results. The histogram peaks of lineaments mapped from Skylab photograph at a scale of 1:517,000 lie subparallel, within 20 deg, to major shale joints and coal cleats on part of the Allegheny Plateau. The Landsat lineament, mapped at 1:989,000 are biased by illumination and scan line directions. While there is an illumination bias in the Skylab photograph, its direction does not coincide with the main transverse lineament trend, thus providing an independent assessment of the illumination direction bias. The coincidence in direction regardless of scale of the linear features suggests a mechanical relationship between joints, fracture traces, and lineaments which is more consistent with a tensional model than a shear model of origin.

N75-30625*# Pennsylvania State Univ., University Park.
APPLICATIONS OF CLUSTER ANALYSIS IN NATURAL RESOURCES RESEARCH Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, and B. J. Turner Jul. 1975 8 p refs Repr. from Forest Sci., v. 20, no. 4, Dec. 1974 p 343-349 Sponsored in part by Dept. of Environ. Resources ERTs
(Contract NAS5-23133)
(E75-10392; NASA-CR-143298; ORSER-SSEL-TR-6-75) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-30626*# Pennsylvania State Univ., University Park.
RELATION OF LINEAMENTS TO SULFIDE DEPOSITS: BALD EAGLE MOUNTAIN, CENTRE COUNTY, PENNSYLVANIA Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, M. D. Krohn, and D. P. Gold Jul. 1975 9 p refs Original contains imagery. Orginal photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-23133)
(E75-10393; NASA-CR-143299; ORSER-SSEL-TR-9-75) Avail: NTIS HC $3.25 CSCL 08G

The author has identified the following significant results. Discrete areas of finely-fractured and brecciated sandstone float are present along the crest of Bald Mountain and are commonly sites of sulfide mineralization, as evidenced by the presence of barite and limonite gossans. The frequency distributions of the brecciated float as the negative binomial distribution supports the interpretation of a separate population of intensely fractured material. Such zones of concentrated breccia float have an average width of one kilometer with a range from 0.4 to 1.6 kilometers and were observed in a quarry face to have subvertical dips. Direct spatial correlation of the Landsat-derived lineaments to the fractured areas on the ridge is low; however, the mineralized and fracture zones are commonly assymetrical to the lineament positions. Such a systematic dislocation might result from an inherent bias in the float population or could be the product of the relative erosional resistance of the silicified material in the mineralized areas in relation to the ersionally weak material at the stream gaps.

N75-30627*# Iowa Geological Survey Remote Sensing Lab.
LAND CLASSIFICATION OF SOUTH-CENTRAL IOWA FROM COMPUTER ENHANCED IMAGES Progress Report, 3 May - 3 Aug. 1975
James V. Taranik, James R. Lucas, Principal Investigators, and Frederic C. Billingsley (JPL) 3 Aug. 1975 18 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(Contract NAS5-20832)
(E75-10394; NASA-CR-143300; Rept-2) Avail: NTIS HC $3.25 CSCL 08F

The author has identified the following significant results. Two CCT (computer compatible tapes) scenes were digitally enhanced. The IMAGE 100 system was utilized for image processing. The real time ability of this machine allowed large scale viewing of several selected areas on both CCT's.

N75-30627*# Martin Marietta Corp., Baltimore, Md.
SKYLAB PROGRAM EARTH RESOURCES EXPERIMENT PACKAGE: GROUND TRUTH DATA FOR TEST SITES (SL-2)
15 Aug. 1975 85 p
(Contract NAS8-24000)
(NASA-CR-141910; MSC-05531) Avail: NTIS HC $4.75 CSCL 08G

Field measurements were performed at selected ground sites in order to provide comparative calibration measurements of sensors for the Earth Resources Experiment Package. Specifically, the solar radiation (400 to 1300 nanometers) and thermal radiation (8-14 micrometers) were measured. Sites employed for the thermal measurements consisted of warm and cold water lakes. The thermal brightness temperature of the lake water, the temperature and humidity profile above the lake, and near surface meteorology (wind speed, pressure, etc.) were measured near the time of overpass. Sites employed for the solar radiation measurements were two desert type sites. Ground measurements consisted of: (1) direct solar radiation - optical depth; (2) diffuse solar radiation; (3) total solar radiation, (4) target directional (normal) reflectance; (5) target hemispherical reflectance; and (6) near surface meteorology. Author

N75-30629*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MONTEREY BAY STUDY
Robert M. Bizzell and Lewis C. Wade Washington 1975 33 p ref Original contains color illustrations
(NASA-SP-359; LC-74-600138) Avail: NTIS MF $2.25; SOD HC $1.45 CSCL 08J

The multispectral scanner capabilities of LANDSAT 1 were tested over California's Monterey Bay area and portions of the San Joaquin Valley. Using both computer aided and image interpretive processing techniques, the LANDSAT 1 data were analyzed to determine their potential application in terms of land use and agriculture. Utilizing LANDSAT 1 data, analysts were able to provide the identifications and areal extent of the individual land use categories ranging from very general to highly specific levels (e.g., from agricultural lands to specific field crop types and even the different stages of growth). It is shown that the LANDSAT system is useful in the identification of major crop species and the delineation of numerous land use categories on a global basis and that repeated surveillance would permit the monitoring of changes in seasonal growth characteristics of crops as well as the assessment of various cultivation practices with a minimum of onsite observation. The LANDSAT system is demonstrated to be useful in the planning and development of resource programs on earth. Author

N75-30630*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT: US STANDARD CATALOG NO. U-35
31 Jul. 1975 71 p
(NASA-TM-X-72459) Avail: NTIS HC $4.25 CSCL 05B

Information regarding the availability of LANDSAT imagery processed and input to the data files by the NASA Data Processing Facility in published on a monthly basis. The U.S. Standard Catalog includes imagery covering the continental United States, Alaska, and Hawaii. The Non-U.S. Standard Catalog identifies all the remaining coverage. Sections 1 and 2 describe the contents and format for the catalogs and the associated microfilm. Section 3 provides a cross-reference defining the beginning and ending dates for LANDSAT cycles. Author

N75-30631*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT NON-US STANDARD CATALOG NO. N-35
31 Jul. 1975 137 p
(NASA-TM-X-72458) Avail: NTIS HC $5.75 CSCL 05B

Information regarding the availability of LANDSAT imagery processed and input to the data files by the NASA Data Processing Facility is published on a monthly basis. The U.S. Standard Catalog includes imagery covering the continental United States, Alaska, and Hawaii. The Non-U.S. Standard Catalog identifies all the remaining coverage. Sections 1 and 2 describe the contents and format for the catalogs and the associated microfilm. Section 3 provides a cross-reference defining the beginning and ending dates for LANDSAT cycles. Author

N75-30632*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
GEOMETRIC ANALYSIS AND RESTITUTION OF DIGITAL MULTISPECTRAL SCANNER DATA ARRAYS
J. R. Baker and E. M. Mikhail 1975 308 p refs
(Contract NAS9-14016; Grant NGL-15-005-112)
(NASA-CR-144398; LARS-052875; T-103914) Avail: NTIS HC $9.25 CSCL 14B

An investigation was conducted to define causes of geometric defects within digital multispectral scanner (MSS) data arrays, to analyze the resulting geometric errors, and to investigate restitution methods to correct or reduce these errors. Geometric transformation relationships for scanned data, from which collinearity equations may be derived, served as the basis of parametric methods of analysis and restitution of MSS digital data arrays. The linearization of these collinearity equations is presented. Algorithms considered for use in analysis and restitution included the MSS collinearity equations, piecewise polynomials based on linearized collinearity equations, and nonparametric algorithms. A proposed system for geometric analysis and restitution of MSS digital data arrays was used to evaluate these algorithms, utilizing actual MSS data arrays. It was shown that collinearity equations and nonparametric algorithms both yield acceptable results, but nonparametric algorithms possess definite advantages in computational efficiency. Piecewise polynomials were found to yield inferior results. Author

N75-30633*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
SPLINE FUNCTION APPROXIMATION TECHNIQUES FOR IMAGE GEOMETRIC DISTORTION REPRESENTATION
Paul E. Anuta 9 Sep. 1975 44 p refs
(Contract NAS9-14016; Grant NGL-15-005-112)
(NASA-CR-144397; LARS-103174) Avail: NTIS HC $3.75 CSCL 08B

Least squares approximation techniques were developed for use in computer aided correction of spatial image distortions for registration of multitemporal remote sensor imagery. Polynomials were first used to define image distortion over the entire two dimensional image space. Spline functions were then investigated to determine if the combination of lower order polynomials could approximate a higher order distortion with less computational difficulty. Algorithms for generating approximating functions were developed and applied to the description of image distortion in aircraft multispectral scanner imagery. Other applications of the techniques were suggested for earth resources data processing areas other than geometric distortion representation. D.M.L.

N75-30634*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
THE FOCUS SERIES 1975: A COLLECTION OF SINGLE-CONCEPT REMOTE SENSING EDUCATIONAL MATERIALS
Shirley M. David 1975 47 p refs
(Contract NAS9-14016; Grant NGL-15-005-112)
(NASA-CR-144396; LARS-IN-052975; T-1039/4) Avail: NTIS HC $3.75 CSCL 08B

The Focus series has been developed to present basic remote sensing concepts in a simple, concise way. Issues currently available are collected here so that more people may know of their existance. Author

N75-30635*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REMOTE SENSING STUDY OF MAUMEE RIVER EFFECTS OF LAKE ERIE

Roger Svehla, Charles Raquet, Don Shook, Jack Salzman, Thom Coney, Douglas Wachter, and Richard Gedney Jul. 1975 28 p refs
(NASA-TM-X-71780; E-8439) Avail: NTIS HC $3.75 CSCL 08H

The effects of river inputs on boundary waters were studied in partial support of the task to assess the significance of river inputs into receiving waters, dispersion of pollutants, and water quality. The effects of the spring runoff of the Maumee River on Lake Erie were assessed by a combination of ship survey and remote sensing techniques. The imagery obtained from a multispectral scanner of the west basin of Lake Erie is discussed: this clearly showed the distribution of particulates throughout the covered area. This synoptic view, in addition to its qualitative value, is very useful in selecting sampling stations for shipboard in situ measurements, and for extrapolating these quantitative results throughout the area of interest. Author

N75-30636*# Hidalgo (John U.), Inc., Metaire, La.
RESEARCH INVESTIGATIONS IN AND DEMONSTRATIONS OF REMOTE SENSING APPLICATIONS TO URBAN ENVIRONMENTAL PROBLEMS Final Report
John U. Hidalgo 25 Jul. 1975 67 p refs
(Contract NAS8-30882)
(NASA-CR-143924) Avail: NTIS HC $4.25 CSCL 05K

The applicability of remote sensing to transportation and traffic analysis, urban quality, and land use problems is discussed. Other topics discussed include preliminary user analysis, potential uses, traffic study by remote sensing, and urban condition analysis using ERTS. Author

N75-30637*# Alabama Univ., Huntsville. School of Graduate Studies and Research.
EARTH RESOURCES DATA ACQUISITION SENSOR STUDY Final Technical Report, 1 Dec. 1974 - 31 May 1975
Edward W. Grohse Jul. 1975 73 p refs
(Contract NAS8-31169)
(NASA-CR-143925) Avail: NTIS HC $4.25 CSCL 08H

The minimum data collection and data processing requirements are investigated for the development of water monitoring systems, which disregard redundant and irrelevant data and process only those data predictive of the onset of significant pollution events. Two approaches are immediately suggested: (1) adaptation of a presently available ambient air monitoring system developed by TVA, and (2) consideration of an air, water, and radiological monitoring system developed by the Georgia Tech Experiment Station. In order to apply monitoring systems, threshold values and maximum allowable rates of change of critical parameters such as dissolved oxygen and temperature are required. Author

N75-30638*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROCEDURE FOR LOCATING 10 km UTM GRID ON ALABAMA COUNTY GENERAL HIGHWAY MAPS
Charles T. N. Paludan 7 Aug. 1975 22 p refs
(NASA-TM-X-64953) Avail: NTIS HC $3.25 CSCL 08B

Each county highway map has a geographic grid of degrees and tens of minutes in both longitude and latitude in the margins and within the map as intersection crosses. These will be used to locate the universal transverse mercator (UTM) grid at 10 km intervals. Since the maps used may have stretched or shrunk in height and/or width, interpolation should be done between the 10 min intersections when possible. A table of UTM coordinates of 10 min intersections is required and included. In Alabama, all eastings are referred to a false easting of 500,000 m at 87 deg W longitude (central meridian, CM). Author

N75-30639*# South Dakota State Univ., Brookings. Remote Sensing Inst.
AIRBORNE THERMOGRAPHY OF TEMPERATURE PATTERNS IN SUGAR BEET PILES
Donald G. Moore and Stanley Bichsel May 1975 21 p refs
(Grant NGL-42-003-007)
(NASA-CR-143384; RSI-SDSU-J-75-05) Avail: NTIS HC $3.25 CSCL 14C

An investigation was conducted to evaluate the use of thermography for locating spoilage areas (chimneys) within storage piles and to subsequently use the information for the scheduling of their processing. Thermal-infrared quantitative scanner data were acquired initially on January 16, 1975, over the storage piles at Moorhead, Minnesota, both during the day and predawn. Photographic data were acquired during the day mission to evaluate the effect of uneven snow cover on the thermal emittance, and the predawn thermography was used to locate potential chimneys. The piles were examined the day prior for indications of spoilage areas, and the ground crew indicated that no spoilage areas were located using their existing methods. Nine spoilage areas were interpreted from the thermography. The piles were rechecked by ground methods three days following the flights. Six of the nine areas delineated by thermography were actual spoilage areas. Author

N75-30640*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ANNUAL REVIEW OF EARTH OBSERVATIONS FROM SPACE
William Nordberg Aug. 1975 16 p refs Presented at the 18th Plenary Meeting of COSPAR, Varna, Bulgaria, 3 Jun. 1975
(NASA-TM-X-70957; X-900-75-208) Avail: NTIS HC $3.25 CSCL 08E

An overview of the present use of satellites for observation of the earth is presented. It is pointed out that instead of being, as previously, limited to relatively narrow objectives, earth observations with much broader objectives are being pursued, so as to gain better understanding of the general circulation of the atmosphere, of geophysical processes in the oceans and solid earth, and of climatic variations. Applications of these observations to such practical concerns as the distribution of food and water resources and environmental protection are illustrated. The use of the LANDSAT and NIMBUS satellites in meeting the requirements of the Global Atmospheric Research Program is described. Author

N75-30641# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE CONTRIBUTION OF AGRICULTURE TO THE EUTROPHICATION OF SWISS WATERS. PART 1: RESULTS OF DIRECT MEASUREMENTS IN THE DRAINAGE AREA OF VARIOUS CHANNELS
R. Gaechter and O. J. Furrer 1975 34 p refs Transl. into ENGLISH from Schweiz. Z. fuer Hydrol. (Birkhaeuser), v. 34, no. 1, 1972 p 41-70
(NRC/CNR-TT-1809-Pt-1; ISSN-0470-2557-Pt-1) Avail: NTIS HC $3.75

Investigations were conducted to analyze the leaching and erosion of nutrients in relatively small drainage areas amenable to observation. The leaching was found to be dependent on the type of soil, the topography, the climate, and the method of cultivation. M.J.S.

N75-30642*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
A RECOGNITION KEY TO SALT MARSH MOSQUITO (AEDES SOLLICITANS) BREEDING AREAS IN SOUTH GALVESTON COUNTY
Gerald K. Arp Oct. 1974 53 p
(Contract NAS9-12200)
(NASA-CR-144404; LEC-4691) Avail: NTIS HC $4.25 CSCL 08B

Application of remote sensing technology to mosquito control is discussed. It is shown that salt marsh mosquito larvae are restricted to a single vegetation type on the Texas gulf coast. Multispectral aerial photography or multispectral scanner data are used to identify this zone for spraying. J.M.S.

N75-30643# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
RELATIONS BETWEEN STRESS AND DEFORMATION OF ICE, CONSIDERING THE TIME FACTOR
S. S. Vyalov and V. A. Chernigov Apr. 1975 14 p ref Transl. into ENGLISH from Tr. Sovetskaya Antarkticheskaya Ekspeditsiya (USSR), no. 10, 1960 p 249-254
(AD-A009054; CRREL-TL-468) Avail: NTIS CSCL 08/12

The stress deformation relationship is given by the exponential

function, the parameters of which are dependent of the rate of loading. During compression the density of ice and its modulus of dynamic elasticity increase. Rules 1 and 2 are valid until a deformation limit epsilon sub T is reached; after which intensive flow occurs and the modulus of dynamic elasticity sharpely decreases. The limiting deformation epsilon sub T is load-rate and load-time independent and is constant for a given ice sample. However, the limiting compression epsilon sub pr is a variable; it is rate and time dependent. The limiting deformation epsilon sub T is a criterion for ice stability, characterizing an intensively progressing flow followed by pulverization, occurrence of microocracks and deterioration of the ice crystals. GRA

N75-30644# National Bureau of Standards, Boulder, Colo.
ELECTROMAGNETIC ATTENUATION PROPERTIES OF CLAY AND GRAVEL SOILS
Doyle A. Ellerbruch Aug. 1974 25 p refs Sponsored in part by AFWL
(COM-75-10522/1; NBSIR-74-381) Avail: NTIS HC $3.25 CSCL 13B

The feasibility of using active microwave techniques to differentiate between the different subsurface layers in a pavement system was examined. The electromagnetic attenuation properties of clay and gravel soils were measured as a function of moisture content and frequency. Measurements were done at frequencies in the 0.5 - 4.5 GHz range. Soil samples were compounded in the laboratory at approximately 10, 50 and 90% saturation. Sample thickness was in the range 2.5 - 20.3 cm. Each homogeneous sample was sealed in a polyethylene container to retain the total moisture and to maintain a constant moisture content with depth. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-30645*+ National Aeronautics and Space Administration, Washington, D.C.
ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES Technical Report, 1 Oct. - 31 Dec. 1974
May 1975 228 p refs
(NASA-SP-7043(04)) Avail: NTIS HC $4.00 CSCL 10B

This bibliography lists 335 reports, articles, and other documents introduced into the NASA scientific and technical information system from October 1, 1974 through December 31, 1974. Author

N75-30646# Federal Power Commission, Washington, D.C.
NATURAL GAS ACT, 1 MARCH 1974
1 Mar. 1974 58 p
Avail: SOD HC $0.70

Legislation is presented which regulates the transportation of natural gas in interstate commerce, the sale in interstate commerce of natural gas for resale for ultimate public consumption, and the natural gas companies engaged in such transportation or sale. J.M.S.

N75-30647*# Pennsylvania Univ., Philadelphia. Dept. of Chemistry.
FUNDAMENTAL STUDIES CONNECTED WITH ELECTRO-CHEMICAL ENERGY STORAGE Final Report
E. Buck and R. Sen [1974] 194 p refs
(Grant NGL-39-010-002)
(NASA-CR-143378) Avail: NTIS HC $7.00 CSCL 10A

Papers are presented which deal with electrochemical research activities. Emphasis is placed on electrochemical energy storage devices. Topics discussed include: adsorption of dendrite inhibitors on zinc; proton discharge process; electron and protron transfer; quantum mechanical formulation of electron transfer rates; and theory of electrochemical kinetics in terms of two models of activation; thermal and electrostatic. J.M.S.

N75-30648# Joint Publications Research Service, Arlington, Va.
SCIENTIFIC RESEARCH IN POWER ENGINEERING
V. M. Fil'kov and A. A. Troitskiy 8 Aug. 1975 22 p refs Transl. into ENGLISH from Teploenerg (Moscow), no. 5, 1975 p 8-11
(JPRS-65422) Avail: NTIS HC $3.25

Data are reported on scientific research of the U.S. and U.S.S.R. in the power engineering field. Author

N75-30649*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIQUID-METAL BINARY CYCLES FOR STATIONARY POWER
Martin Gutstein, Edward R. Furman, and George M. Kaplan Washington Aug. 1975 33 p refs
(NASA-TN-D-7955; E-8023) Avail: NTIS HC $3.75 CSCL 10A

The use of topping cycles to increase electric power plant efficiency is discussed, with particular attention to mercury and alkali metal Rankine cycle systems that could be considered for topping cycle applications. An overview of this technology, possible system applications, the required development, and possible problem areas is presented. Author

N75-30650*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTERIM SOLAR CELL TESTING PROCEDURES FOR TERRESTRIAL APPLICATIONS
Henry Brandhorst, John Hickey (Eppley Labs., Newport, R. I.), Henry Curtis (Spectrolab, Inc., Sylmar, Calif.), and Eugene Ralph 1975 19 p
(NASA-TM-X-71771; E-8421) Avail: NTIS HC $3.25 CSCL 10A

An interim draft of a set of test procedures, developed by NASA/ERDA, for the manufacture of solar cells is introduced. This version includes procedures for cell testing both outdoors in natural sunlight and indoors in simulated sunlight, a description of the necessary apparatus and equipment, the calibration and use of standard solar cells, and a proposed air-mass-two (AM2) solar spectrum. Author

N75-30651*# Naval Weapons Support Center, Crane, Ind. Weapons Quality Engineering Center.
EVALUATION PROGRAM FOR SECONDARY SPACECRAFT CELLS: INITIAL EVALUATION TESTS OF GULTON INDUSTRIES, INCORPORATED, 9.0 AMPERE-HOUR NICKEL-CADMIUM SPACECRAFT CELLS WITH AUXILIARY ELECTRODES FOR THE SMALL ASTRONOMY SATELLITE (SAS-C)
J. D. Harkness 2 Jul. 1975 18 p
(Contract NASA Order S-53742-AG)
(NASA-CR-144666; WQEC/C-75-165) Avail: NTIS HC $3.25 CSCL 10A

An evaluation test program was conducted to insure that all cells put into the life cycle program are of high quality by the screening of cells found to have electrolyte leakage, internal shorts, low capacity, or inability of any cell to recover its open-circuit voltage above 1.150 volts during the internal short test. Tests and results are described. Author

N75-30652*# Naval Weapons Support Center, Crane, Ind.
EVALUATION PROGRAM FOR SECONDARY SPACECRAFT CELLS: INITIAL EVALUATION TESTS OF GENERAL ELECTRIC COMPANY 6.0 AMPERE-HOUR NICKEL-CADMIUM SPACECRAFT CELLS FOR THE IMPROVED TIROS OPERATIONAL SATELLITE (ITOS)
J. D. Harkness 1 Jul. 1975 14 p
(Contract NASA Order S-23404-G)
(NASA-CR-144667; WQEC/C-75-164) Avail: NTIS HC $3.25 CSCL 10A

Quality control measures for Ni-Cd spacecraft cells were analyzed. Cells were examined for electrolyte leakage, internal

shorts, low capacity, or inability of any cell to recover its open circuit voltage above 1.50 volts during the internal short test. Test results are given in tabular form. Author

N75-30653# Joint Publications Research Service, Arlington, Va.
HISTORY AND DEVELOPMENT OF USSR REFINING, PETROCHEMICAL INDUSTRY
11 Aug. 1975 44 p Transl. into ENGLISH from the book "Neftepererabatyvayushchaya i Neftekhimicheskaya Promyshlennost SSSR K 50-Letiyu Oktyabrya" p 19-46, 191-204 (JPRS-65433) Avail: NTIS HC $3.75

The development of the U.S.S.R. refining and petrochemical industry is reviewed. Author

N75-30654# Cambridge Collaborative, Inc., Mass.
STATISTICAL ENERGY ANALYSIS FOR DESIGNERS. PART 1. BASIC THEORY Final Report, Apr. 1972 - Dec. 1973
Richard H. Lyon Sep. 1974 184 p refs
(Contract F33615-72-C-1196; AF Proj. 1370)
(AD-A006413; Rept-73-1-Pt-1; AFFDL-TR-74-56-Pt-1) Avail: NTIS CSCL 20/11

This report describes the theoretical development of Statistical Energy Analysis (SEA). The historical development of the subject and an extensive annotated bibliography are included to add perspective to the technical discussions. Those aspects of random vibration theory are reviewed first. Then, the coupled vibration of randomly excited resonators is discussed. Using these results as a basis, the SEA model of coupled systems is introduced, and the consequences of the model are derived. From these basic relationships, a scheme for the prediction of vibration levels in coupled, randomly excited, resonantly vibrating systems is developed. GRA

N75-30655# Cambridge Collaborative, Inc., Mass.
STATISTICAL ENERGY ANALYSIS FOR DESIGNERS. PART 2. THE ENGINEERING APPLICATION Final Report, Apr. 1972 - Dec. 1973
Richard H. Lyon and Huw G. Davies Sep. 1974 212 p refs
(Contract F33615-72-C-1196; AF Proj. 1370)
(AD-A006414; Rept-73-1-Pt-2; AFFDL-TR-74-56-Pt-2) Avail: NTIS CSCL 20/11

This report is concerned with the practical applications of Statistical Energy Analysis (SEA) to the prediction of vibration in high speed flight vehicles. The procedures of estimation, based on the theory presented in Part I, are presented in Section I of the report. The authors describe how energy estimates are used to infer stress, displacement, or other dynamical variables. Obtaining the energy estimates is described next, and the SEA parameters mode count, loss factor, and coupling loss factor are introduced. A discussion of SEA modelling completes Section I. Experimental and analytical procedures for evaluating the SEA parameters are presented in Section II. In Section III, an example of the use of SEA to predict the vibration of an equipment shelf in a reentry vehicle is described in some detail. GRA

N75-30656# Army Foreign Science and Technology Center, Charlottesville, Va.
A THERMOCOUPLE BATTERY
S. Ya. Klyuch, V. M. Braude, and O. A. Gerashchenko 15 Apr. 1974 4 p Transl. into ENGLISH from Russian Patent 345370 (AD-A005958; FSTC-HT-23-101-74) Avail: NTIS CSCL 14/2

A modification of an existing type of copper plated constantan wire thermocouple is described. The new design employs a configuration which doubles the exposure of the thermocouple junctions to radiation and thereby increases the sensitivity. The additional advantage of a simpler construction is noted. GRA

N75-30657# Army Electronics Command, Fort Monmouth, N.J.
ENGINEERING EVALUATION OF THERMAL INSULATION OF MAGNESIUM-MANGANESE DIOXIDE DRY BATTERY PERFORMANCE
Donald B. Wood Apr. 1975 17 p refs
(DA Proj. 1S7-62705-AH-94-P)
(AD-A008948; ECOM-4302) Avail: NTIS CSCL 10/3

Substantial improvements in magnesium-manganese dioxide (Mg/MnO2) dry battery performance were obtained by thermally insulating the battery to retain the heat evolved during discharge. The influence of discharge temperature at 130F and 220F on discharge capacity of individual cells is assessed relative to 74F capacity between the 25 and 100 hour discharge rate. Magnesium Batteries BA-4386/PRC-25 (A2 Section), surrounded by varying thicknesses of thermal insulation, were discharged at a constant 5 Watt drain at operating temperatures varying from minus 25 to plus 160F. Performance data are presented for Magnesium Battery BA-4840/U, with and without insulation, and with and without a nickel-cadmium (NiCd) battery in a hybrid configuration. GRA

N75-30658# Dow Chemical Co., Walnut Creek, Calif.
RESEARCH AND DEVELOPMENT IN THE GLASS FIBER SODIUM-SULFUR BATTERY Semiannual Technical Report
Charles A. Levine 31 Dec. 1974 23 p refs
(Contract DAHC15-73-C-0254; ARPA Order 2381)
(AD-A008849) Avail: NTIS CSCL 10/3

The electrochemical characteristics of the hollow fiber sodium-sulfur cell have been shown to be outstanding. The major problem now is to obtain increased lifetimes with the same good performance. The authors want to demonstrate long life (years) with many thousands of charge-discharge cycles in cells that do not change internal resistance with total time in operation. The heating-cooling characteristics of the cells still must be determined. GRA

N75-30659# Energy and Environmental Analysis, Inc., Arlington, Va.
PROJECTED REGIONAL ENERGY AVAILABILITY IN 1985 Final Report, 1 Jul. 1974 - 15 Jan. 1975
15 Jan. 1975 100 p
(Contract DAAK02-75-C-0080; DA Proj. 4A7-62719-A-886)
(AD-A008938) Avail: NTIS CSCL 10/1

Fixed Army facility energy requirements, in the context of national and regional energy trends through 1985, are evaluated. The national energy outlook in terms of the availability and price of various sources of energy is discussed. Demand and price forecasts are made for each energy source for each of nine census regions. Fixed Army Facility energy demands are forecasted within the nine regions by type of energy required. GRA

N75-30660# Office of the Chief of Engineers (Army), Washington, D.C. Studies Group.
ARMY INSTALLATION ENERGY REQUIREMENTS IN CONUS Final Report
Jan. 1975 147 p refs
(AD-A008951) Avail: NTIS CSCL 10/1

This report displays data relevant to current (FY 73) energy consumption and gives estimates of projected 1990 energy requirements at 75 Army installations in the Continental U.S. The current (FY 73) consumption of electrical energy is characterized by 10 energy regions and by type of installation. The totals for fuel consumption are presented by region, type of fuel, and size of boiler and heating plants. Future electrical energy requirements for troop installations were estimated based on projected populations combined with FY 73 per capita consumption at each installation. Estimates for other installations were based on an estimated or assumed activity level. This study estimates a 7.2% increase in electrical energy requirements by 1990 and a 3.4% reduction in fuel requirements. GRA

N75-30661# Montana State Univ., Bozeman. Water Resources Res. Center.
WATER USE AND COAL DEVELOPMENT IN EASTERN MONTANA: WATER AVAILABILITY, WATER DEMANDS AND ECONOMIC IMPACTS
Paul E. Polzin Nov. 1974 233 p
(PB-241331/8; MUJWRRC-57; W75-06978;
OWRT-C-5258(4217)(1)) Avail: NTIS HC $7.50 CSCL 13B

A one year study was conducted to assess Montana's role in the national energy picture (particularly from the standpoint of strip coal mining development); to describe the region in terms of economy, agriculture, water use and people, with a section on the Indian population; and to project the impact of coal related development in terms of coal mining, electrical

generation and gasification. Included in the projected impact were studies of future levels of coal development, coal related employment and earnings, total employment, population and income, and water use increases. Findings were classified according to two alternative projections for coal development in Montana for 1980 and 1985 (no gasification). GRA

N75-30662# Montana State Univ., Bozeman. Water Resources Research Center.
WATER USE AND COAL DEVELOPMENT IN EASTERN MONTANA. WATER AVAILABILITY AND DEMANDS
Richard L. Stroup and Stuart B. Townsend Dec. 1974 98 p refs
(Contract DI-14-31-0001-4217)
(PB-241332/6; MUJWRRC-59; W75-06979; OWRT-C-5258-MONT(2)) Avail: NTIS HC $4.75 CSCL 13B

A one-year, two-phase study was undertaken to assess the availability and demand for water in the coal region of eastern Montana. The physical availability of surface and groundwater was treated, as were the legal problems associated with coal development, broken down by type of development. Data presented indicate that sufficient groundwater is available in eastern Montana to permit substantial amounts of coal development. Use of this water would not be without cost, however. Direct costs of impoundment and delivery, and foregone opportunities for using the water instream must be considered. The demand for water in coal development will depend in part on the cost of water to developers. GRA

N75-30663# Army Electronics Command, Fort Monmouth, N.J.
A STATE-OF-CHARGE TEST FOR ZINC-MERCURIC OXIDE PRIMARY CELLS
John J. Winter, James T. Breslin, Raymond L. Ross, Herbert A. Leupold, and Frederick Rothwarf Mar. 1975 32 p refs
(DA Proj. 1T1-61102-A-34A)
(AD-A009067; ECOM-4300) Avail: NTIS CSCL 10/3

A readily instrumented and conducted nondestructive technique to determine the state of charge of zinc-mercuric oxide primary cells has been developed and preliminary results obtained. Measurements of the current vs voltage (1-V) characteristics, the AC impedance, the electronically sampled derivative at different sampling currents and frequencies, and the discharge-time characteristics of the cells as a function of charge expended have been made and are reported. The nearly constant slopes of the 1-V curves above 75 mA were measured graphically. These studies indicate that this technique constitutes a useful, easily applied state-of-charge test. GRA

N75-30664# Hawaii Univ., Honolulu.
WIND ENGINEERING RESEARCH DIGEST, VOLUME 1
Arthur N. L. Chiu 1974 115 p refs
(Grant NSF GK-38047)
(PB-241010/8) Avail: NTIS HC $5.25 CSCL 04B

The wind engineering research digest (WERD) is a survey of current projects in various aspects of wind engineering research. Information was collected through questionnaires distributed directly and through various professional organizations. Wind engineering research is classified under the following headings: structure of wind, wind-wave effects, effects on urban areas, wind loading on structures, severe storms, design for hurricanes and tornadoes, fullscale testing, Model testing, environmental factors, psycho-physical factors, legal factors, special problems, wind considerations in urban planning, building codes and regulations, socio-economic effects, international cooperation, and wind energy conversion systems. An index by investigator, subject and institution is included. GRA

N75-30665# National Academy of Sciences - National Research Council, Washington, D.C.
MATERIALS TECHNOLOGY IN THE NEAR-TERM ENERGY PROGRAM
Dec. 1974 129 p refs
(Grant NSF C-310)
(PB-240942/3; ISBN-0-309-02322) Avail: NTIS HC $5.75 CSCL 10B

Materials research and development is reported that could affect energy supply and demand during the period prior to 1985. Assessed are major energy programs that can have significant impact within the time frame, including coal gasification and liquefaction, oil shale, high temperature gas turbines, and the use of critical elements. The capital investment estimates and the impact of materials technology in each are discussed. Other energy programs are also discussed, including nuclear power reactors, energy storage, and geothermal, nuclear, and solar energy sources. GRA

N75-30666*# Bureau of Mines, Laramie, Wyo. Laramie Energy Research Center.
THERMAL REACTIONS OF SHALE-OIL COMPONENTS: PLANT PIGMENTS AS PROBABLE PRECURSORS OF NITROGENOUS COMPOUNDS IN SHALE OIL
Larry P. Jackson and Andrew W. Decora Mar. 1975 27 p refs
(PB-241216/1; BM-RI-8018) Avail: NTIS HC $3.75 CSCL 07C

Reduced chlorophyllins were prepared and pyrolyzed in an effort to identify the role of plant pigments and their decomposition products in the nitrogenous compounds found in the product of oil-shale pyrolysis. The properties of the chlorophyllin pyrolysates were related to the composition of the reduced chlorophyllins. A comparison based on the types of nitrogen compounds present was made between shale oil and the chlorophyllin pyrolsates. This information was used to evaluate reduced chlorophyllin as a model of oil-shale kerogen insofar as the production of nitrogen compounds was concerned. The results indicate that the reduced chlorophyllin does represent a good model of shale-oil kerogen. GRA

N75-30667# Minnesota Univ., Minneapolis. Dept. of Management Sciences.
REGIONAL IMPACTS OF ALTERNATIVE ENERGY ALLOCATION STRATEGIES
Wilbur R. Maki and Peter C. Knobloch 1 May 1974 27 p refs Presented at 6th Ann. Meeting of the Mid-Continent Regional Sci. Assoc., Urbana, Ill., 5-6 Apr. 1974
(PB-241125/4; MEA/RIAE-74/8) Avail: NTIS HC $3.75 CSCL 05B

The impacts are considered of the energy crisis and its shortages on the energy management decision process, and the specific gainers and losers of allocation strategies, with tradeoffs in costs of having or not having energy information. Input/output models are discussed, as are industrial/household-use data for operational decision making; energy stocks and flow, facility locations with their impacts, as well as data collection and analysis as they relate to industrial growth and employment and to services and materials, are reviewed. Economic tradeoffs of individual allocation criteria are estimated. The input/output framework is used to achieve consistency in the total set of economic variables in the economic information for energy planning. GRA

N75-30668# National Academy of Sciences - National Research Council, Washington, D.C. Building Research Advisory Board.
SOLAR HEATING/COOLING OF BUILDINGS: CURRENT BUILDING COMMUNITY PROJECTS Interim Report
1974 47 p
(Contract NSF C-310)
(PB-241117/1) Avail: NTIS HC $3.75 CSCL 13A

Brief descriptions of 21 projects involving the use of solar energy for heating and cooling buildings are presented. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-30669 British Library Lending Div., Boston Spa (England).
INVESTIGATIONS ON DECOMPOSITION OF LIQUID FUELS BY MARINE MICROORGANISMS
M. Maciejowska and E. Rakowska May 1975 27 p refs Transl. into ENGLISH from Prace Morskiego Instytutu Rybackiego. (USSR) v. 17, ser. A, 1974 p 181-203
(BLL-RTS-9420) Avail: British Library Lending Div., Boston Spa, Engl.: £10.00; 16 BLL photocopy coupons

A definition is presented for the participation of microflora

in the decomposition of oils in the Baltic Sea. The rate of degradation of oil impurities was also determined. Data are limited to liquid fuel oils used in Polish shipping operations. Author

N75-30670*# IIT Research Inst., Chicago, Ill.
ATMOSPHERIC SCAVENGING OF HYDROCHLORIC ACID Final Report
Earl O. Knutson and Donald L. Fenton Washington NASA Aug. 1975 80 p refs
(Contract NAS8-30807; IITRI Proj. C6312)
(NASA-CR-2598) Avail: NTIS HC $4.75 CSCL 13B

The scavenging of hydrogen chloride from a solid rocket exhaust cloud was investigated. Water drops were caused to fall through a confined exhaust cloud and then analyzed to determine the amount of HCl captured during fall. Bubblers were used to measure HCl concentration within the chamber. The measured chamber HCl concentration, together with the measured HCl deposition on the chamber walls, accounted for 81 to 94% of the theoretical HCl. It was found that the amount of HCl captured was approximately one-half of that predicted by the Frossling correlation. No effect of humidity was detected through a range of 69-98% R.H.. The scavenging of HCl from a solid rocket exhaust cloud was calculated using an idealized Kennedy Space Center rain cycle. Results indicate that this cycle would reduce the cloud HCl concentration to 20.6% if its value in the absence of rain. Author

N75-30671*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
LOW ALTITUDE TEMPERATURE AND HUMIDITY PROFILE DATA FOR APPLICATION TO AIRCRAFT NOISE PROPAGATION
Andrew B. Connor, W. Latham Copeland, and Danny C. Fulbright (Natl. Climatic Center, Asheville, N. C.) Washington Sep. 1975 60 p
(NASA-TN-D-7975; L-10117) Avail: NTIS HC $4.25 CSCL 20A

A data search of the weather statistics from 11 widely dispersed geographical locations within the continental United States was conducted. The sites, located long both sea-coasts and in the interior, span the northern, southern, and middle latitudes. The weather statistics, retrieved from the records of these 11 sites, consist of two daily observations taken over a 10-year period. The data were sorted with respect to precipitation and surface winds and classified into temperature intervals of 5 C and relative humidity intervals of 10 percent for the lower 1400 meters of the atmosphere. These data were assembled in a statistical format and further classified into altitude increments of 200 meters. The data are presented as sets of tables for each site by season of the year and include both daily observations. Author

N75-30672*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A GENERALIZED TENSOR FORMULATION OF ATMOSPHERE AND SEAS DYNAMICS
Lee M. Avis, Richard E. Turner, and Thomas H. Rees Washington Sep. 1975 65 p refs
(NASA-TR-R-441; L-9928) Avail: NTIS HC $4.25 CSCL 08J

A generalized mathematical model was developed for simulation of the dynamics and transport of both the atmosphere and seas. A nearly horizontal bottom coordinate surface conforms to the land-to-air interface and the sea-floor-to-water interface, which simplifies computations. General vertical motion of the other quasi-horizontal coordinate surfaces is allowed; external gravity waves can be represented by the top coordinate surface, and meteorological fronts and inversion layers in the atmosphere and refractive layers in the seas can be represented with enhanced resolution by the internal quasi-horizontal coordinate surfaces. A tensor reformulation of the standard subgrid mixing theory departs significantly from the standard theory in allowing, as a solution under adiabatic conditions, rigid-body rotation of the atmosphere. Author

N75-30673# Virginia Univ., Charlottesville.
ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER, AN ECOSYSTEM APPROACH; VOLUME 1 Final Technical Report, Jul. 1972 - Jun. 1974
William S. Woolcott Oct. 1974 427 p
(Contract DI-14-31-0001-9003)
(PB-241035/5; W75-06298-1-Vol-1;
OWRT-C-4016(9003)(1)-Vol-1) Avail: NTIS HC $11.25 CSCL 06F

The ecological relationships of organisms from natural temperature waters and those exposed to the thermal effluents of a fossil-fueled electric power station were examined. Parameters investigated included seasonal changes and distribution of populations of fishes, benthic macroin-vertebrates and algae; entrainment of organisms in the cooling water system of the power station; food-web investigation within and outside of the plume; and physico-chemical analyses of heated and ambient temperature water. Oxygen and dissolved nutrient levels indicated moderate organic loading. Diatoms were adversely affected when temperatures in the plume were 29C or higher; blue-green algae populations flourished under these high temperature conditions. GRA

N75-30674# Virginia Univ., Charlottesville.
ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER, AN ECOSYSTEM APPROACH; VOLUME 2 Final Report, Jul. 1972 - Jun. 1974
William S. Woolcott Oct. 1974 250 p refs
(Contract DI-14-31-0001-9003)
(PB-241036/3; W75-06298-Vol-2;
OWRT-C-4016(9003)(1)-Vol-2) Avail: NTIS HC $7.50 CSCL 06F

The results of an investigation of the impact of thermal loading on the fishes in the James River by Virginia Electric Power Company Bremo Power Station are presented. Objectives were to determine in influence of the heated discharge on the species composition, abundance, and biomass of fish populations within the area under study. An effort was made to quantitate the data for statistical analyses through standardization of collecting procedures. The relation of the seasonal distribution of selected species to the thermal plume was also analyzed. GRA

N75-30675# Army Construction Engineering Research Lab., Champaign, Ill.
COMPUTER-AIRDED ENVIRONMENTAL IMPACT ANALYSIS FOR CONSTRUCTION ACTIVITIES, USER MANUAL
L. V. Urban, H. E. Balbach, R. K. Jain, E. W. Novak, and R. E. Riggins Mar. 1975 83 p
(DA Proj. 4A1-621-A-896)
(AD-A008988; CERL-TR-E-50) Avail: NTIS CSCL 13/2

The document is a manual designed to help Army personnel assess construction activities for preparation and review of Environmental Impact Assessments (EIA) and Environmental Impact Statements (EIS) by means of the Environmental Impact Computer System (EICS). This system has been developed and maintained by the U.S. Army Construction Engineering Research Laboratory (CERL). GRA

N75-30676# Army Foreign Science and Technology Center, Charlottesville, Va.
RAPID METHODS FOR DETERMINATION OF HARMFUL SUBSTANCES IN THE AIR
E. A. Perequd, M. S. Bykhovshaya, and E. Gernet 18 Oct. 1974 689 p refs Transl. into ENGLISH of the book "Bystrye Metody Opredeleniya Vrednykh Veshchestv v Vozdukhe" Moscow, Khimiya, 1970 357 p
(AD-A008598; FSTC-HT-23-0844-74) Avail: NTIS CSCL 07/4

Apparatus, sampling techniques, and rapid methods for determination of toxic substances in the air are described. Soviet and foreign stationary and portable type gas analyzers are surveyed. Methods of preparing known concentrations of gases for calibration of instruments and checking of determination methods are discussed. GRA

N75-30677# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
WATER POLLUTION SAMPLER EVALUATION Final Comprehensive Report, May 1972 - Dec. 1974
Jesse J. Barkley, Jr., Kelly M. Peil, and Jerry W. Highfill Jan. 1975 159 p refs

(DA Proj. 3A7-62720-A-835)
(AD-A009079; TR-7501) Avail: NTIS CSCL 14/2

This report outlines standardized procedures for the evaluation of water and wastewater samplers. Sixteen samplers, which represented the various types available, were selected for evaluation. Synthetic wastewaters were developed and consisted of six classes of naturally occurring wastewater constituents. Test physical constraints were established to include lift, temperature and sampling duration. The evaluation also included a reliability test and a field test. Each evaluated sampler is discussed with reference to its ease of operation, representativeness of sample and relation to the predefined ideal sampler. Laboratory and field data are described and discussed. The samplers are ranked as to their overall performance. GRA

N75-30678# Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
FAST CURRENT OIL CONTROL STUDY
William P. Graebel and Vernon A. Phelps Aug. 1974 198 p refs
(Contract DOT-CG-32430-A)
(AD-A009040; USCG-D-84-75) Avail: NTIS CSCL 13/2

Model studies of oil containment barriers and herding devices were conducted in an open channel of six foot width and three and one-half foot depth. Currents up to four feet per second were used with three different oils. Incipient failure of the barriers occurred for values of the densimetric Froude number of about unity. Trajectories of the oil drops at incipient failure are given. Oil herding devices were tested at various angles to the current. This performance in regard to loss rates was superior to that of the barriers, and improved as the angle between current and herder was decreased. Multiple barriers and barriers with nets were also tested. A vortex oil recovery device was conceived and tested, which showed only very small loss rates at all speeds tested. Its rate of recovery of a slick increased with current speed. GRA

N75-30679# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
INUNDATION DAMAGE TO VEGETATION AT SELECTED NEW ENGLAND FLOOD CONTROL RESERVOIRS
Harlan L. McKim, Lawrence W. Gatto, and Carolyn J. Merry Mar. 1975 49 p refs Prepared in cooperation withs Corps of Engr., Waltham, Mass.
(AD-A009075; CRREL-SR-220) Avail: NTIS CSCL 13/2

The effect on vegetation of inundation caused by the regulation and impoundment of water at six New England flood control reservoirs during the June-July 1973 flood was assessed from color infrared photography and corroborative ground surveys. A large amount of reservoir storage was utilized during the two-week inundation period, resulting in extensive damage to vegetation. Four degrees of apparent vegetative damage were differentiated from color infrared photography based on color differences ranging from bright red on magenta for healthy foliage to cyan for unhealthy, damaged or dying vegetation. Correlative ground truth data showed that the deciduous trees, particularly silver maple and red oak, were least affected and that coniferous trees, especially white pine, were most affected by siltation and inundation. Much of the understory vegetation, i.e. poplar, basswood and hornbeam, lost all leaves after inundation but new buds and shoots reappeared by late September 1973. Generally, trees inundated for less than 90 hours were not extensively damaged. GRA

N75-30680# Naval Ship Research and Development Center, Bethesda, Md.
EMISSIONS FROM AN OVERHEATED ELECTRIC MOTOR WITH SLOT CELLS AND WINDING PHASES INSULATED WITH AN AROMATIC POLYAMIDE PAPER
Peter Demas and Thomas C. Johnson Apr. 1975 18 p refs
(AD-A009051; NSRDC-4287) Avail: NTIS CSCL 07/4

A standard Navy 10-horsepower electric motor, with varnish wire and slot cells and phases insulated with an aromatic polyamide paper, was operated in a glass enclosure at sequential operating temperatures (from 73C to 334C) in order to trap possible hydrogen cyanide and/or other volatile emissions generated under normal and overheat conditions. The total emission of hydrogen cyanide (669 micrograms) on heating would produce only 0.02 parts per million hydrogen cyanide concentration if this amount were released in a 1000 cubic-foot room. Only aldehydes reached the threshold limit value (2 parts per million). GRA

N75-30681# GCA Corp., Bedford, Mass. Technology Div.
PARTICULATE EMISSION CONTROL SYSTEMS FOR OIL-FIRED BOILERS Final Report
J. Sahagian, R. Dennis, and N. Surprenant Dec. 1974 82 p refs
(PB-241277/3; EPA-450/3-74-063) Avail: NTIS HC $4.75 CSCL 13B

The results of this study are reported in three sections: (1) a listing of oil-fired combustion units including their size, fuel rate and composition, type and performance of particulate control equipment, and methodology used to procure these data; (2) an assessment of the effectiveness of the particulate control equipment and the impact of coal-to-oil conversions, sulfur and ash content, fuel additives, sootblowing, base or peak load operations on equipment performance; and (3) the technical feasibility and cost of installing particulate controls on existing and proposed oil-fired systems. GRA

N75-30682# Babcock and Wilcox Co., Lynchburg, Va. Research and Development Div.
EFFECTS OF DESIGN AND OPERATING VARIABLES ON NOx FROM COAL-FIRED FURNACES, PHASE 2 Final Report
W. Joseph Armento Feb. 1975 151 p
(Contract EPA-68-02-0634)
(PB-241283/1; EPA-650/2-74-002b) Avail: NTIS HC $6.25 CSCL 21B

Results are reported for an investigation of combustion modification techniques for controlling NOx emissions that have application to pulverized coal fired utility boilers. The techniques included: Excess air, air preheat, firing rate, flue gas recirculation, staged, combustion, quench, and swirl. Tests showed that NOx reductions of up to 65% were possible by using staged combustion or by lowering excess air levels from 30 to zero %. Flue gas recirculation yielded only moderate NOx reductions for coal. For existing units, control of excess air appears to be the simplest method for NOx reduction. Where possible, staged combustion could be retrofitted on existing units to achieve further NOx reductions. GRA

N75-30683# National Environmental Research Center, Research Triangle Park, N.C. Chemistry and Physics Lab.
MEASUREMENT OF THE OPACITY AND MASS CONCENTRATION OF PARTICULATE EMISSIONS BY MASS TRANSMISSOMETRY
William D. Conner Nov. 1974 38 p refs
(PB-241251/8; EPA-650/2-74-128) Avail: NTIS HC $3.75 CSCL 14B

The relationship between the opacity of plumes and their visual effects, and the relationship between the opacity of plumes and their particulate mass concentration are discussed. Optical design characteristics of transmissometers that are necessary for measurement of the opacity of particulate emissions are also discussed. Various methods for remote measurement of plume opacity are reviewed, including the visible emission observer. GRA

N75-30684# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
CHARGED DROPLET SCRUBBING OF SUBMICRON PARTICULATE Final Report
J. R. Melcher and K. S. Sachar Aug. 1974 259 p refs
(Contract EPA-68-02-0250)
(PB-241262/5; EPA-650/2-74-075) Avail: NTIS HC $8.50 CSCL 07A

Results are given of an investigation of the collection of charged submicron particles, through a sequence of interrelated experiments and theoretical models: by oppositely charged supermicron drops; by bicharged drops; and by drops charged to the same polarity as the particles. Experimentally verified laws of collection for a system with different effective drop and gas residence times are provided. It is shown experimentally and through theoretical models, that all three of the above configura-

tions have the same collection characteristics. Charging of the drops in any of these cases results in dramatically improved efficiency, compared to inertial scrubbers and approaches the efficiency of high-efficiency electrostatic precipitators. GRA

N75-30685# National Field Investigations Center, Denver, Colo.
RECONNAISSANCE STUDY OF RADIOCHEMICAL POLLUTION FROM PHOSPHATE ROCK MINING AND MILLING
Dec. 1973 106 p refs
(PB-241242/7) Avail: NTIS HC $5.25 CSCL 13B

A reconnaissance study of the phosphate mining and milling industry was necessary to investigate the magnitude of radiochemical pollution to receiving waters. This report describes the findings of the study and other related problems associated with processing of phosphate fertilizers, such as air pollution, ground-water contamination, possible deleterious consequences of fertilizer use, effects on other receiving water uses, including shellfish and drinking water supplies, and the use of by-product material in the construction industry. Sampling results are compared with promulgated radiochemical standards and guidelines. Pollution control and analysis and water quality data are also discussed. GRA

N75-30686# National Academy of Sciences - National Research Council, Washington, D.C.
PLANNING FOR ENVIRONMENTAL INDICES Final Report
Feb. 1975 57 p refs Sponsored in part by Dept. of Commerce, Geological Survey, and EPA
(Contract EQC-326)
(PB-240971/2; EQC-326275) Avail: NTIS HC $4.25 CSCL 05A

This study examines the important multidisciplinary considerations related to environmental indices and makes recommendations regarding their development. The report includes examples of indices and a short bibliography. GRA

N75-30687# Texas Technological Univ., Lubbock. Water Resources Center.
VARIATION OF URBAN RUNOFF QUALITY AND QUANTITY WITH DURATION AND INTENSITY OF STORMS, PHASE 3
Gary B. Thompson, Dan M. Wells, Robert M. Sweazy, and B. J. Claborn Aug. 1974 63 p refs
(Contract DI-14-31-0001-4130)
(PB-241406/8; WRC-74-2; W75-06975; OWRT-B-177-TEX(1)) Avail: NTIS HC $4.25 CSCL 13B

In the watershed in Lubbock, Texas, 35 percent of the total precipitation appeared as direct runoff. From storm, to storm runoff pollutant concentrations varied widely in average and extreme values. There was a continuous, though highly variable, discharge during dry weather from the storm sewer, totaling approximately two million gallons per year. Quality of the dry weather flow was poorer than that of untreated domestic sewage. Discharges resulting from efforts to fight major fires contained significant quantities of pollutants. A facility should be constructed to provide interception and storage of the storm sewer discharge. Such a holding pool should trap all dry weather flow, and all flows resulting from unusual events. GRA

N75-30688# General Electric Co., Santa Barbara, Calif.
RATIONALE AND METHODOLOGY FOR MONITORING GROUNDWATER POLLUTED BY MINING ACTIVITIES Environmental Monitoring Series
Don L. Warner Jun. 1974 85 p refs
(Contract EPA-68-01-0759)
(PB-241402/7; GE74TMP-22; EPA-680/4-74-003) Avail: NTIS MF $2.25; HC SOD CSCL 13B

Methodology for monitoring groundwater pollution caused by mining and mineral processing is considered. Because of the broad range of mining activities and diversity of geologic and hydrologic settings, monitoring programs for mineral operations must be individually considered. The report reviews technology for at-source control of water pollution from mining and points out that some methods used to improve surface water quality may cause deterioration in groundwater quality. It also discusses existing state and Federal laws and regulations for control of mine drainage pollution and the inability of most to influence the design, permitting, or abandonment of underground mines on the basis of water pollution considerations. GRA

N75-30689# Pennsylvania State Univ., University Park. Center for the Study of Science Policy.
THE EFFECTS OF MOBILE-SOURCE AIR AND NOISE POLLUTION ON RESIDENTIAL PROPERTY VALUES Final Report, Mar. 1974 - Apr. 1975
Jon P. Nelson Apr. 1975 250 p refs
(Contract DOT-OS-40094)
(PB-241570/1; DOT-TST-75-76) Avail: NTIS HC $7.50 CSCL 13B

Air and noise pollution damages, due to transportation activity are capitalized into the value of residential property. The following damage relationships are measured: (1) mobile-source air pollution represented by photochemical oxidant concentrations; (2) stationary-source air pollution represented by suspended particulate matter concentrations; (3) highway traffic noise (4) jet aircraft noise measured by the Noise Exposure Forecast; and (5) accessibility in terms of auto travel times. For a given type of pollution, the resulting marginal damage value is used to approximate the discounted benefits of pollution abatement. These benefits are compared to the expected costs of abatement. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N75-30690 British Library Lending Div., Boston Spa (England).
HOW INFRARED RADIATION LINKS WITH UPPER AND LOWER ATMOSPHERE, AND THE POSSIBILITY OF USING GEOMAGNETIC PERTURBATIONS TO FORECAST PRESSURE VARIATION AT SEA LEVEL
B. F. Gordiec, M. N. Markov, and L. A. Selepin [1974] 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk (Moscow), v. 212, 1973 p 341-344
(BLL-23574-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

A mechanism for transferring energy from the upper atmosphere down to the stratosphere and troposphere is discussed. It is shown how small perturbations caused by the release of this energy, may lead to large pressure variations (occurring at a rate of up to several mb in 24 hrs) at sea level, the sign varying with the geographical region. Author

N75-30691 Institut d'Aeronomie Spatiale de Belgique, Brussels.
STABLE AURORAL RED ARCS AND THEIR IMPORTANCE FOR THE PHYSICS OF THE PLASMAPAUSE REGION
R. J. Hoch and J. Lemaire 1975 19 p refs Presented at the Symp. on Plasmapause Phys., Trieste, Italy, 23 26 Sep. 1974
(Aeronomica-Acta-A-141-1975) Avail: Issuing Activity

A stable auroral red (SAR) arc is a diffuse glowing zone detected in the midlatitude atmosphere during the main phase of a geomagnetic storm. The spectrum, the intensity, the spatial distribution, the frequency of occurrences, and the position of these subvisual line emissions are reported. Their close connection with the plasmapause and ring current regions is described. The different theories proposed for the formation of SAR arcs are also reviewed and briefly discussed. Author (ESRO)

N75-30692 Institut d'Aeronomie Spatiale de Belgique, Brussels.
A TWO-DIMENSIONAL MODEL OF THE STRATOSPHERE [UN MODELE BI-DIMENSIONNEL DE LA STRATOPHERE]
G. Brasseur and M. Bertin (Soc. Natl. Ind. Aerospatiale) 1975 32 p refs In FRENCH; ENGLISH summary Presented at the COMESA-COVOS Meeting, Oxford, 24-26 Sep. 1974
(Aeronomica-Acta-A-146-1975) Avail: Issuing Activity

The meridional distribution of several minor constituents of the stratosphere is determined for the stationary case. This mathematical model holds from the earth's surface to the stratosphere and from pole to pole. Mass transport is parameterized by a turbulent-diffusion tensor. After a detailed study,

the most important chemical and photochemical reactions are taken into consideration in the calculations. The influence of nitrogen oxides in the distribution of ozone is demonstrated. The possible effect of an increase in the quantity of NOx is envisaged. Author (ESRO)

N75-30693 Institut d'Aeronomie Spatiale de Belgique, Brussels.
CONTRIBUTION TO THE STUDY OF IONS IN THE POLAR IONOSPHERE [CONTRIBUTION A L'ETUDE DES IONS DANS L'IONOSPHERE POLAIRE]
J. Lemaire and M. Scherer 1975 105 p refs In FRENCH; ENGLISH summary
(Aeronomica-Acta-A-147-1975) Avail: Issuing Activity

A high order hydrodynamic approximation (e.g. Navier-Stokes) is used to describe the efflux of the ions in the polar ionosphere up to the exobase between 1000 and 1500 km altitude. A kinetic approximation is used to describe the charged particle distribution in the exosphere. The photo and thermal equilibrium conditions for the H+ and O+ ions at 500 km, combined with continuity conditions at the exobase, yield a unique solution for the three transport equations in the hydrodynamic Navier-Stokes approximation. It is found that the H+ ion efflux has a subsonic velocity in the collision dominated region, but becomes supersonic above the exobase in the collision free exobase. The numerical solution of the energy equations shows a temperature increase for the light ions. Above the exobase the hydrogen ion temperature decreases adiabatically with increasing height. Near the exobase the flow speed or bulk velocity of the hydrogen ions becomes equal to the thermal velocity and the temperature reaches a maximum. Author (ESRO)

N75-30694 Institut d'Aeronomie Spatiale de Belgique, Brussels.
A GEOMAGNETIC EFFECT IN THE MEAN THERMOSPHERE [UN EFFET GEOMAGNETIQUE DANS LA THERMOSPHERE MOYENNE]
J. Vercheval 1975 28 p refs In FRENCH; ENGLISH summary Submitted for publication
(Aeronomica-Acta-A-152-1975) Avail: Issuing Activity

The results of a density analysis for the altitude range between 165 and 215 km (thermosphere) determined by the satellite drag data are reported and related to the geomagnetic activity due to the solar wind effect. In particular, the existence of a daily density variation in the mean thermosphere could be associated with the McIntosh component of the geomagnetic activity. ESRO

N75-30695 Institut d'Aeronomie Spatiale de Belgique, Brussels.
SOLAR EXTREME ULTRAVIOLET HEATING AND DYNAMICAL PROCESSES IN THE MID-LATITUDE THERMOSPHERE
P. Amayenc (Centre Natl. d'Etude des Telecommun.), D. Alcayde (Centre d'Etudes Spatiales des Rayonnements), and G. Kockarts 1975 24 p refs Submitted for publication
(Aeronomica-Acta-A-153-1975) Avail: Issuing Activity

Using a global pressure gradient model deduced from satellite drag data, the momentum and the mass conservation equations are solved to obtain the neutral wind vector at midlatitude. In this computation, the ion drag term is calculated from incoherent scatter measurements at Saint-Santin (France). The most important terms of the energy conservation equation are calculated and the relative importance of dynamical heating processes is deduced and compared with direct extreme ultraviolet (EUV) heat input. The model used in the computation is roughly consistent with solar EUV heating, if vertical and horizontal transport effects are included in the energy balance equation. Author (ESRO)

N75-30696*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
REVISION OF GEODETIC PARAMETERS
E. M. Gaposchkin and M. R. Williamson Aug. 1975 26 p refs
(Grant NGR-09-015-002)
(NASA-CR-143331) Avail: NTIS HC $3.75 CSCL 08N

Laser data from nine satellites and 12 stations are combined with surface-gravity data to obtain spherical harmonics representing the geopotential complete through degree and order 18. This laser-data-only solution provides a reasonable improvement to the gravity field. Author

N75-30697# Joint Publications Research Service, Arlington, Va.
EFFECTIVE LOSS FACTOR IN THE D-REGION OF THE IONOSPHERE DURING SUDDEN IONOSPHERIC PERTURBATIONS
V. V. Belikovich 31 Jul. 1975 13 p refs Transl. into ENGLISH from Izv. Vuz Radiofizika (USSR) v. 27, no. 10, 1974
(JPRS-65365) Avail: NTIS HC $3.25

The altitude profile of the effective loss factor was found for three sudden ionospheric disturbances observed in Gor'kiy in June 1970. The profiles of the electron concentration were determined by the method of partial reflections. The ion production function was computed for three models of the solar X-ray emission spectrum according to data measurements on satellites. The results obtained confirm the presence of peculiarities in the altitude distribution of the loss factor in the region of 60 to 80 km. Author

N75-30698*# Northrop Services, Inc., Huntsville, Ala.
KINETIC DESCRIPTION OF IONOSPHERIC DYNAMICS IN THE THREE-FLUID APPROXIMATION
R. H. Comfort Washington NASA Jul. 1975 247 p refs
(Contract NAS8-21810)
(NASA-CR-2572) Avail: NTIS HC $7.50 CSCL 04A

Conservation equations are developed in the three-fluid approximation for general application problems of ionospheric dynamics in the altitude region 90 km to 800 km for all geographic locations. These equations are applied to a detailed study of auroral E region neutral winds and their relationship to ionospheric plasma motions. Author

N75-30699*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DATA FOR NASA'S AVE 4 EXPERIMENT: 25-mb SOUNDING DATA AND SYNOPTIC CHARTS
Nancy F. Fucik (Texas A/M Univ., College Station) and Robert E. Turner Aug. 1975 461 p refs
(NASA-TM-X-64952) Avail: NTIS HC $11.50 CSCL 04A

The AVE 4 Experiment is described and tabulated rawinsonde data at 25-mb intervals from the surface to 25 mb for the 42 stations participating in the experiment are presented. Soundings were taken between 0000 GMT, April 24 and 1200 GMT, April 25, 1975. The methods of data processing and accuracy are discussed. Synoptic charts prepared from the data are presented, as well as an example of contact data. Author

N75-30700*# Kanner (Leo) Associates, Redwood City, Calif.
DUST IN THE ATMOSPHERE AND NEAR-EARTH SPACE
N. B. Divari, ed. Washington NASA Jul. 1975 333 p refs Transl. into ENGLISH of the book "Ply v Atmosferi i Okolozemnom Kosmicheskom Prostranstve" Moscow, Nauka Press, 1973 p 1-212
(Contract NASw-2481)
(NASA-TT-F-16368) Avail: NTIS HC $9.25 CSCL 04A

The results are given of measurements of dust in the near-earth space, based on studies of meteors, micrometeor material, and micrometeoroids. A series of articles is presented, which give the results of studies of dust in the upper atmosphere, primarily by various studies of twilight phenomena. The possibilities of usable photoelectric observations of satellities as they enter the shadow of the earth are discussed. The results of voluminous, primarily ground observations of light scattering by tropospheric dust particles are included. Author

N75-30701# Committee on Aeronautical and Space Sciences (U. S. Senate).
EARTHQUAKE RESEARCH AND KNOWLEDGE
Washington GPO 1975 264 p refs Hearing before Comm. on Aeron. and Space Sci., 94th Congr., 1st Sess., 26 Apr. 1975
(GPO-53-523) Avail: Comm. on Aeron. and Space Sci.

Testimony is given on the past and present activities of earthquake research and on methods of earthquake-hazard reduction. These methods include engineering technology, and urban and regional planning and zoning. It is shown that earthquake-hazards exist along the San Andreas fault in California, the Wasatch fault in Utah and Idaho, and in zones of possible severe seismic activity in Kentucky, Arkansas, Missouri, South

Carolina, and the northeastern States. The application of LANDSAT imagery to earthquake research and reduction is discussed.
J.M.S.

N75-30702*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
QUANTIFICATION OF GEOLOGIC LINEAMENTS BY MANUAL AND MACHINE PROCESSING TECHNIQUES
Melvin H. Podwysocki, Johannes G. Moik (Computer Sci. Corp., Silver Spring, Md.), and Walter C. Shoup (Computer Sci. Corp., Silver Spring, Md.) Jul. 1975 28 p refs Presented at NASA Earth Resources Symp., Houston, Texas, June 1975 Submitted for publication
(NASA-TM-X-70951; X-923-75-183) Avail: NTIS HC $3.75 CSCL 08G

The effect of operator variability and subjectivity in lineament mapping and methods to minimize or eliminate these problems by use of several machine preprocessing methods was studied. Mapped lineaments of a test landmass were used and the results were compared statistically. The total number of fractures mapped by the operators and their average lengths varied considerably, although comparison of lineament directions revealed some consensus. A summary map (785 linears) produced by overlaying the maps generated by the four operators shows that only 0.4 percent were recognized by all four operators, 4.7 percent by three, 17.8 percent by two, and 77 percent by one operator. Similar results were obtained in comparing these results with another independent group. This large amount of variability suggests a need for the standardization of mapping techniques, which might be accomplished by a machine aided procedure. Two methods of machine aided mapping were tested, both simulating directional filters. Author

N75-30703*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GRAVITATIONAL HARMONICS FROM SHALLOW RESONANT ORBITS
Carl A. Wagner and S. M. Klosko (Wolf Res. and Develop. Center, Riverdale, Md.) Jul. 1975 50 p refs Presented at the Fall Annual Meeting of the American Geophysical Union, San Francisco, Calif. Submitted for publication
(NASA-TM-X-70953; X-921-75-187) Avail: NTIS HC $3.75 CSCL 20J

Five gravitational constraints were derived for the GEOS 2 orbit (order 13, to 30th degree) whose principal resonant period is 6 days. The constraints explain the sinusoidal variation with argument of perigee of a lumped harmonic found from 41 6-day arcs of optical and laser data. The condition equations, derived from elementary perturbation theory are shown to account for almost all of the resonant information in the tracking data.
Author

N75-30704*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE MAGNON ENERGY IN HAEMATITE. 1: MAGNON ENERGY OF THE OPTICAL MODE AND THE MORIN PHASE TRANSITION
N. L. Bonavito, O. Nagai (Kobe Univ., Japan), and T. Tanaka (Catholic Univ. of America) Jun. 1975 29 p refs
(NASA-TM-X-70943; X-932-75-150) Avail: NTIS HC $3.75 CSCL 08G

The stability of the magnetic spin configurations in the antiferromagnet Hematite near the Morin phase transition magnetic ordering temperature was investigated. The critical temperature was determined by calculating the temperature dependence of the renormalized fundamental energy modes of the system. Finally, it is shown that the total optical mode energy is small if the basic noninteracting high energy spin mode or free optical mode is small: there is therefore little correlation or interaction between magnetic atoms as a function of temperature. Author

N75-30705*# Scientific Translation Service, Santa Barbara, Calif.
ON THE MICROSTRUCTURE OF THE WIND VELOCITY AND TEMPERATURE FIELDS IN THE UPPER TROPOSPHERE AND LOWER STRATOSPHERE
N. Z. Pinus Washington NASA Jun. 1975 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Fiz. Atmos. Okeana (USSR), v. 10, Nov. 1974 p 1131-1137
(Contract NASw-2483)
(NASA-TT-F-16398) Avail: NTIS HC $3.25 CSCL 04A

Results of experimental studies are presented for fluctuations of wind velocity, temperature, rate of dissipation of turbulent motion energy epsilon, rate of dissipation for temperature N, and temperature structure characteristics C sub t (2) at the heights 7-18 km. The determination of C sub t (2), carried out by two different methods, confirms the reliability of the universal constants values recommended for the one-dimensional spectra of wind velocity and temperature fluctuations (0.14 and 0.21 correspondingly for the dimension of wave numbers in the inverse length units). Author

N75-30706# Council for Scientific and Industrial Research, Pretoria (South Africa).
A COMPARISON BETWEEN MAPPING OF GEOLOGICAL DISCONTINUITIES AND SEISMIC MEASUREMENTS
E. Brueckl and W. Fuerlinger 1974 14 p refs Transl. into ENGLISH from Z. fuer Geophysik (West Germany), v. 39, 1973 p 291-302
(CSIR-Trans-1199) Avail: NTIS HC $3.25

The comparison of the mapping of geological discontinuities with seismic measurement showed that both experimental methods can benefit from simultaneous application. If in seismic plotting a relation is set up between the jointing coefficient and the longitudinal wave velocity in a lithologically homogeneous region, a quick and objective method for further determining the two jointing coefficients for a rock mass may be obtained. A comparison with the mapping of discontinuities offers seismology the possibility of calculating the longitudinal wave velocity in non-jointed rock. Furthermore, the calculation of relative jointing coefficients or joint intensities from the Schmidt plot makes a qualitative prediction of the seismic anisotropy possible. The influence of joints on the longitudinal wave velocity in the area investigated was very great due to the intense karstification and shallow penetration depth of the seismic waves, but the effect should also be considered in less obviously jointed rock together with its lithologic properties in the discussion of seismic anisotropy. The investigation covered the eastern area of the Hochkonig massif in the county of Salzburg. Author

N75-30707# Photometrics, Inc., Lexington, Mass.
VISIBLE AND INFRARED RADIATIONS FROM THE ATMOSPHERE ACCOMPANYING PCA EVENTS Final Report, 1 Sep. 1973 - 31 Aug. 1974
Irving L. Kofsky and John W. Schroeder 30 Sep. 1974 111 p refs
(Contract F19628-74-C-0037; AF Proj. 6690)
(AD-A006134; AFCRL-TR-74-0476) Avail: NTIS CSCL 04/1

To optimize use of solar proton events that produce Polar Cap Absorption (PCA) for understanding the chemical and dynamical behavior of the artificially-disturbed atmosphere, past PCA optical/infrared results are analyzed and intensity (and excitation temperature) of chemiluminous, photolytic, and fluorescent features predicted; additionally, applications of ionosphere-emissions measurements of PCA to specific problems of optical and communications system degradation are reviewed. GRA

N75-30708# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
WINDS OBSERVED FROM MAY 1971 THROUGH OCTOBER 1974 IN THE 77 TO 194 km ALTITUDE REGION Final Report, 1 Apr. 1971 - 31 Mar. 1974
Robert G. Roper and Howard D. Edwards Oct. 1974 74 p
(Contract F19628-71-C-0070; AF Proj. 7635)
(AD-A006129; GIT-AER-E-16-616; AFCRL-TR-74-0537) Avail: NTIS CSCL 04/1

Horizontal winds and shears have been computed from 18 rocket released chemical trails. Tables are presented which give vertical profiles of wind speed, heading, meridional and zonal components, and wind shear components. Three of the rockets produced releases on both the up and down leg of their trajectories. These data are useful for investigation of spatial variations. The wind data for May, 1971 (KAY, LYNN, MARY, ORA and PAM), and April, 1972 (CLARA, ELLA, FREDA, GLADYS and HOPE) relate to time series releases made within a single

night; KAY and LYNN were in fact simultaneous launches. Two more time series pairs were released in April, 1972 (INGRID and JANE), and in October, 1972 (KATHY and LANA). These data are suitable for time variation studies. A large number of point (puff) series releases, namely 14 trails, have been reduced to provide vertical as well as horizontal winds. In addition to the tabled values, graphs of the zonal, meridional, and, where appropriate, vertical wind components are also presented. GRA

N75-30709# Aerospace Corp., El Segundo, Calif.
PALEOMAGNETOSPHERIC RADIAL DIFFUSION Interim Report
Michael Schulz 26 Feb. 1975 16 p refs
(Contract F04701-74-C-0075)
(AD-A008801; TR-0075(5260-20)-4; SAMSO-TR-75-91) Avail: NTIS CSCL 04/1

The geomagnetic dipole moment is known to be a function of time. Those magnetospheric parameters which depend on the dipole moment must similarly be functions of time, even when sampled under identical solar-wind conditions. Siscoe has recently deduced the dependence of various magnetospheric spatial and temporal scales on the dipole moment, and has introduced the term paleomagnetosphere to describe the historical configuration of the earth's magnetic cavity. The purpose of the present work is to propose acceptable scaling laws for the historical treatment of certain radial-diffusion coefficients that affect the earth's radiation belts. GRA

N75-30710# General Research Corp., Santa Barbara, Calif.
IONOSPHERIC MODIFICATION: ITS EFFECTS ON RADAR AND SATELLITE COMMUNICATION SYSTEMS
G. F. VanBlaricum and H. S. Ostrowsky Oct. 1974 113 p refs
(Contract DAAH01-73-C-0310; ARPA Order 958)
(AD-A008847; GRC-RM-1911) Avail: NTIS CSCL 04/1

High-power RF radio transmissions have been used to create significant local disturbances of the temperature and electron density in the F-region of the ionosphere. This artificial modification of the ionosphere can create appreciable levels of amplitude and phase scintillation in radio signals passing through the disturbed region. The report describes and reorganizes some of the PRAIRIE SMOKE experimental data and presents a brief overview of scintillation theory. The experimental data were used to develop a model for predicting scintillation effects along any particular line-of-sight through the disturbed region. That model is presented here and predictions made using it are compared to some of the experimental data. Scintillation can degrade radar detection probability, radar tracking accuracy, and satellite-to-ground communication error rates. These degradation were computed parametrically as functions of the scintillation index. GRA

N75-30711# Texas Univ., Dallas.
RESEARCH FOR DETERMINING PROPAGATION CHARACTERISTICS FOR ARPA'S NORWEGIAN ARRAY Interim Report
Mark Landisman 27 Sep. 1974 12 p refs
(Contract F19628-73-C-0285; AF Proj. 1795)
(AD-A006135; SR-1; AFCRL-TR-74-0494) Avail: NTIS CSCL 17/10

The first annual report narrates a program of research directed toward measuring the propagation delay for a number of different, individually dispersed seismic surface wave trains which are observed by the long period elements of ARPA's Norwegian Large Seismic Array, during the passage of disturbances from sufficiently energetic, distant, sub-crustal seismic events. It is expected that the availability of these improved delay measurements can help to improve the detection, identification, and location capabilities of the array. GRA

N75-30712# Teledyne Geotechnical, Alexandria, Va. Seismic Data Analysis Center.
ANALYSIS OF SEISMIC DATA FOR THE RIO BLANCO EXPLOSION
D. H. VonSeggern 19 Jun. 1974 89 p refs
(Contract F08606-74-C-0006; ARPA Order 1620)
(AD-A005781; SDAC-TR-74-9) Avail: NTIS CSCL 17/10

Seismic analysis of RIO BLANCO, an underground nuclear explosion for gas stimulation, was performed using LRSM, LPE, and array recordings. Although a multiple detonation, RIO BLANCO was similar to other western U.S. shots and especially RULISON, another gas-stimulation explosion 55 km away. Magnitude-yield relations, shear generation, and spectral content of RIO BLANCO were not untypical for underground explosions. A source function which includes p(P) and P(spall) was inferred from the seismic data. An accurate location was obtained for RIO BLANCO using travel-time anomalies for RULISON. GRA

N75-30713# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
MOISTURE AND FREEZE-THAW EFFECTS ON RIGID THERMAL INSULATION
Chester W. Kaplar Apr. 1974 36 p refs
(AD-A008869; CRREL-TR-249) Avail: NTIS CSCL 13/3

This report presents data from a limited investigation of some physical properties of predominantly rigid foamed plastic thermal insulations of various types. Included in the study were boards of mineral wool, cork, perlite, calcium silicate, urethane, extruded polystyrene and polystyrene beadboard. Long term moisture absorption tests were conducted both in water and after burial in moist soil. Simulated deep submersion tests (1 atmospheric pressure) were made and wetted insulations were subjected to 30 freeze-thaw cycles to observe the effect of these parameters. Strength and flammability characteristics were also evaluated. GRA

N75-30714# Naval Research Lab., Washington, D.C.
PROCEEDINGS OF SYMPOSIUM ON THE EFFECT OF THE IONOSPHERE ON SPACE SYSTEMS AND COMMUNICATIONS
1975 446 p refs Symp. held at Arlington, Va., 20-22 Jan. 1975
(AD-A008939) Avail: NTIS CSCL 04/1

Papers primarily dealing with ionospheric scintillation are presented. Topic areas include: High altitude morphology; spectra of amplitude and phase scintillation; amplitude and fade statistics for equatorial scintillations; holographic radio camera technique for studying ionospheric inhomogeneities; electron and ion density studies; Faraday rotation and angle of arrival measurements; and solar cycle variations of the total electron content at low latitude. GRA

N75-30715# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A KINETIC MODEL FOR THE PREDICTION OF KINETIC COOLING M.S. Thesis
Victor H. Leonard Mar. 1975 59 p refs
(AD-A008659; GEP/PH-75-8) Avail: NTIS CSCL 07/4

A completely general theory capable of predicting the time history of the temperature of an arbitrary atmosphere subject to a specified form of radiation was developed. The theory was designed to use information based on simple binary reactions and easily measured quantities. It was then specifically tailored to the search for examples of kinetic cooling at other than the confirmed example at 10.6 micrometers in the atmosphere. Although tailored to the infrared portion of the spectrum, the theory was still relatively flexible in terms of the particular constituents and reactions which it could accommodate. Calculations of most of the required elements of the theory for an atmosphere composed of CO2, H2O, N2, and O2 were made. GRA

N75-30716# Helsinki Univ. (Finland). Inst. of Seismology.
COMPRESSIONAL WAVE POWER SPECTRUM FROM SEISMIC SOURCES Final Report, 30 Jun. 1972 - 31 Dec. 1974
Ilkka T. Noponen 21 Feb. 1975 70 p refs
(Grant AF-AFOSR-2377-72; ARPA Order 2131-1; AF Proj. 2131)
(AD-A008961; ISBN-951-45-0538-7; AFOSR-75-0399TR) Avail: NTIS CSCL 17/10

The power spectra and waveforms of P-wave signals are studied using large aperture seismic array data. P-wave pulse lengths and attenuation are determined by deconvolution of records to earth displacement, and by comparing spectral shapes with predictions from source models. A least-square procedure

is used to fit predicted spectra to observations by varying model parameters. In a classification experiment using statistical limits derived from NORSAR data and pulse widths measured at LASA, classification capability intermediate between the spectral discriminant LTM and the m sub b - M sub s discriminant was achieved, without any regional corrections. GRA

N75-30717# Continental Oil Co., Ponca City, Okla. Research and Development Dept.
SEISMIC MINE MONITOR SYSTEM, PHASE 2 Summary Report, 1 Aug. 1973 - 1 Jun. 1974
James C. Fowler Oct. 1974 46 p
(Contract DI-BM-HO-133112)
(PB-241504/0; BM-OFR-24-75) Avail: NTIS HC $3.75 CSCL 08I

The possibility is considered of using a seismic listening system to detect and locate miners trapped in areas where other communications were not available. This report covers the installation and testing of a permanent seismic monitor system at the loveridge Mine in West Virginia. The testing of the system showed the following: getting the seismic data back to the central computer in a usable form is possible; detecting small explosions is possible; using this system as an auxiliary system to detect hammer blows from miners trapped in the area of one of the geophones is possible. GRA

N75-30718# Pennsylvania State Univ., University Park.
MICROSEISMIC TECHNIQUES APPLIED TO COAL MINE SAFETY Final Report, 15 Jun. 1970 - 31 Mar. 1974
H. Reginald Hardy, Jr. 31 Mar. 1974 216 p refs
(Grant DI-BM-GO-101743)
(PB-241208/8; BM-OFR-23-75) Avail: NTIS HC $7.25 CSCL 08I

The results are given of a study to determine the feasbility of using transducers arrays, located on surface or in shallow boreholes, above an active coal mine to detect and locate the sources of microseismic activity that occurs during mining. The initial stage of the project involved the design and development of a self-contained mobile microseismic monitoring facility capable of use in remote field locations. Using the facilities and techniques developed, field studies were carried out at a number of surface locations over a central Pensylvania coal mine operating at depths of about 500 feet. In particular, studies were conducted over a previously mined developement area, troubled by extensive problems of roof instability, and over two longwall panels during mining. GRA

N75-30719# Kentucky Univ., Lexington. Dept. of Electrical Engineering.
MINE SURVEY AND RESCUE B VEHICLE Final Report
R. L. Cosgriff 1 Jun. 1974 173 p refs
(Contract DI-BM-HO-101358)
(PB-241214/6; BM-OFR-27-75) Avail: NTIS HC $6.25 CSCL 08I

A commercial, battery-powered mine vehicle equipped for remote operation in coal mines and controlled by an operator from the remote station is discussed. Command signals originating at the remote station as well as video and data signals originating on board the vehicle are relayed between the remote station and vehicle using a single coaxial line. This vehicular system was tested in coal mines. Presently, the major limitation of this system is associated with fatigue failure of the splices in the coaxial line and lack of mobility caused by its 3-wheel design. GRA

N75-30720# Geological Survey, Denver, Colo. Geologic Div.
GRAVITY DATA FOR YELLOWSTONE-ISLAND PARK REGION, IDAHO, MONTANA, WYOMING Final Report
1975 68 p
(PB-241637/8; USGS-GD-75/004) Avail: NTIS HC $4.25 CSCL 08E

Observed gravity values, station locations, terrain corrections, and Bouguer gravity data are provided in tabular form for approximately 1,540 gravity observations in the Yellowstone National Park-Island Park region of Idaho, Montana, and Wyoming. These data were used in preparation of U.S. Geological Survey Open-File Report 74-22, Complete Bouguer gravity map, Yellowstone-Island Park region, Idaho-Montana-Wyoming, by H. Richard Blank and Mark E. Gettings, 1974. GRA

N75-30721# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
IONOSPHERIC DATA
Mar. 1974 126 p refs
(COM-74-50087-355; NOAA-ISPOA-FA-355; NOAA-74041007) Avail: NTIS MF $2.25; HC available from National Climatic Center, Federal Building, Asheville, N. C. 28801 $1.00/copy, $10.00/year CSCL 04A

Detailed data are given from an exemplary station, Wallops Island (Washington) including daily-hourly values of all characteristics, f-plots for Regular World Days, and an N(h) contour graph. As timely information, there is included selected ionospheric data for a Retrospective World Interval, when appropriate. Also given is information on ionospheric data recently received at World Data Center A for Solar-Terrestrial Physics and other information on availability of data from the WDC's. GRA

N75-30967 Cagliari Univ. (Italy). Ist. di Astronomia.
PERIODIC AND QUASI-PERIODIC FLUCTUATIONS IN THE MOTION OF THE EARTH'S POLE
E. Proverbio and S. Uras *In* ESRO Space Astrometry Mar. 1975 p 83-93 refs (For availability see N75-30957 21-89)

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-30722 Freie Univ., Berlin (West Germany).
METEOROLOGICAL DATA. VOLUME 141, NO. 8: RESULTS OF SYNOPTIC SERVICES IN 1974 DAILY AND MONTHLY WEATHER CHARTS (SURFACE, 850 MILLIBARS, 500 MILLIBARS), TABLES AND SCIENTIFIC NOTATIONS, AUGUST [METEOROLOGISCHE ABHANDLUNGEN. BAND 141, HEFT 8: ERGEBNISSE DES SYNOPTISCHEN DIENSTES IM JAHRE 1974]
1974 179 p In GERMAN
Avail: Issuing Activity

Daily and monthly Northern Hemisphere ground level, 850 mb, and 500 mb height and temperature analyses of constant pressure levels for August 1974 are presented. Included scientific studies cover aspects of synoptic climatology over the Berlin sector, and data on atmospheric radioactivity and dust content. Transl. by G.G.

N75-30723+ Engineering Sciences Data Unit, London (England).
CHARACTERISTICS OF ATMOSPHERIC TURBULENCE NEAR THE GROUND. PART 3: VARIATIONS IN SPACE AND TIME FOR STRONG WINDS (NEUTRAL ATMOSPHERE)
Jul. 1975 31 p refs Sponsored by Roy. Aeron. Soc., Inst. of Chem. Engr., Inst. of Mech. Engr., and Inst. of Structural Engr.
(ESDU-75001) Copyright. Avail: NTIS HC $170.50

A means of estimating the two-dimensional statistical properties of turbulence for strong winds (neutral atmosphere) for different heights over varying types of terrain is provided for calculating the dynamic wind loads on, and response of, ground-based structures and aircraft in atmospheric turbulence. The data are applicable to heights up to about 300 m and for cases when the mean-hourly wind speed at a height of 10 m is greater than about 10 m/s or the atmosphere is neutrally stable (lapse rate about 1 C per 100m). Author

N75-30724# Joint Publications Research Service, Arlington, Va.
METEOROLOGY AND HYDROLOGY, NO. 5, 1975
29 Jul. 1975 95 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 47 p
(JPRS-65338) Avail: NTIS HC $4.75

Articles are presented on microclimate, agricultural meteorology, weather forecasting and climate control, hydrological forecasting, the activities and personnel of the Soviet Hydrome-

teorological Service, and new publications. For individual titles, see N75-30725 through N75-30731.

N75-30725 Joint Publications Research Service, Arlington, Va.
DETERMINATION OF THE PHASE CHARACTERISTICS OF CLOUDS BY SATELLITE OBSERVATIONS
A. K. Gorodetskiy, D. T. Matveyev, Ye. P. Dombkovskaya, N. I. Manuylova, and A. P. Orlov *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 1-7 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 66-71 (For availability see N75-30724 21-47)

The possibility of determining the phase composition of clouds using complex measurements of the electromagnetic radiation in the infrared and microwave bands of the spectrum from artificial earth satellites is analyzed. Specific examples are presented of the determination of the phase composition of the clouds by the measurement data from the Kosmos-243 and Kosmos-384 satellites. Author

N75-30726 Joint Publications Research Service, Arlington, Va.
FORECASTING THE AIR TEMPERATURE AND PRESSURE BY THE PRIMITIVE SYSTEM OF EQUATIONS OF HYDRO-THERMODYNAMICS CONSIDERING OROGRAPHY
Z. V. Khvedelidze *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 8-16 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 72-78 (For availability see N75-30724 21-47)

By using operation calculus the forecasting formulas were derived for the meteorological elements considering orography. In order to obtain the solution to the problem of forecasting the meteorological elements, the primitive system of equations of hydrothermodynamics was used in the quasistatic and quasiadiabatic approximation. Author

N75-30727 Joint Publications Research Service, Arlington, Va.
THE RECENT AFRICAN DROUGHT
A. D. Gedeonov *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 17-26 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 79-85 (For availability see N75-30724 21-47)

On the basis of analyzing the annual precipitation totals and their spatial distribution, the characteristics of the drought in the Sudan-Sahel zone of Africa are presented. Author

N75-30728 Joint Publications Research Service, Arlington, Va.
CALCULATING THE ICE COVER OF THE GULF OF FINLAND FOR THE SPRING NAVIGATION PERIOD
S. G. Nikolayev *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 27-34 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 86-91 (For availability see N75-30724 21-47)

The method is described of predicting the characteristics of the ice cover in the Gulf of Finland for the second half of winter navigation. The method was developed considering the thermal effect of the water on the ice in the edge zone, the intensity of which varies as a consequence of the increase in solar radiation coming on to the surface of the sea and as the edge of the ice retreats toward the head of the Gulf of Finland. Author

N75-30729 Joint Publications Research Service, Arlington, Va.
SOME RESULTS OF OBSERVATIONS OF THE SPRING RUNOFF ON FORESTED AND NONFORESTED WATER-SHEDS
Ye. S. Zmiyeva and A. I. Subbotin *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 35-45 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 92-99 (For availability see N75-30724 21-47)

The results are studied of work on the organization of the water budget observations in the 15 pairs of forested and unforested small watersheds selected in the European Territory of the U.S.S.R. in accordance with the program of the International Hydrologic Decade. The data obtained make it possible to define the available concepts of runoff formation in the forest, in the unforested sections, and in the partially forested river basins in the nonchernozem zone. Author

N75-30730 Joint Publications Research Service, Arlington, Va.
FORECASTING THE WINTER WHEAT GRAIN HARVEST IN THE NONCHERNOZEM ZONE BASED ON NEW AGROME-TEOROLOGICAL DATA
M. S. Kulik *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 46-53 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 100-105 (For availability see N75-30724 21-47)

The studies of the possibilities of forecasting the grain harvest in a specific field are generalized. It is demonstrated that the new form of information (the results of electronic determination of the biomass accumulation) is opening up broad possibilities for predicting the harvest in a specific year. With sufficient mineral nutrition the most noticeable effect on the winter wheat grain harvest will be felt from the productive moisture reserves in the 0 to 50 cm layer during the 30 days before heading out and the duration of the period of renewal of vegetation to heading. The set correlation coefficients and regression equations are presented. The proportion of the grain in the total winter wheat yield as a function of the agrometeorological conditions in the nonchernozem zone fluctuates from 15 to 50%. Author

N75-30731 Joint Publications Research Service, Arlington, Va.
SUPERHIGH FREQUENCY RADIOMETRIC METHODS OF MEASURING MOISTURE IN THE LOWER TROPOSPHERE
A. G. Gorelik, L. S. Raykova, and Yu. A. Frolov *In its* Meteorology and Hydrology, No. 5, 1975 (JPRS-65338) 29 Jul. 1975 p 54-64 refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 5, 1975 p 106-112 (For availability see N75-30724 21-47)

The microwave radiometric methods of determining the moisture in the lower troposphere were studied by measuring the intensity of the radio wavelength emission of the atmosphere, and the position of the singularities in the angular distribution of the radio wavelength emission in the wavelength band from 0.8 to 1.6 cm. A comparison, and an analysis of the results of measuring the atmospheric moisture obtained by the various microwave radiometric methods are presented. The results of the measurements are considered in order to create operative remote methods of moisture sounding of the atmosphere. Author

N75-30732*# Chicago Univ., Ill. Dept. of Geophysical Sciences.
CHARACTERISTICS OF ANVIL-TOP ASSOCIATED WITH THE POPLAR BLUFF TORNADO OF 7 MAY 1973
Edward W. Pearl 7 May 1973 13 p refs
(Grants NGR-14-001-008; NOAA-04-4-158-1)
(NASA-CR-143348; SMRP-119) Avail: NTIS HC $3.25 CSCL 04B

Investigation of potential tornado-producing thunderstorms was performed during part of the 1972 and 1973 tornado seasons. On May 7, 1973 twenty-one tornadoes were confirmed over southern Missouri, northern Arkansas, and southwestern Illinois. The region was surveyed by high altitude photography performed on a Learjet over the region of reported tornadoes. Two storms were chosen from aircraft observation with the guidance of ground and radar reports, and a series of photographs were taken of a tornado producing cloud. An analysis of the activity before and during the tornado is made, and most noteworthy were changes detected in the growth and collapse of overshooting domes above the anvil. Suggestions are included for a comprehensive study. Author

N75-30733*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE NATURE OF MULTIPLE SOLUTIONS FOR SURFACE WIND SPEED OVER THE OCEANS FROM SCATTEROME-TER MEASUREMENTS
John C. Price Jul. 1975 17 p refs Submitted for publication
(NASA-TM-X-70949; X-913-75-175) Avail: NTIS HC $3.25 CSCL 04B

The satellite SEASAT-A will carry a radar scatterometer in order to measure microwave backscatter from the sea surface. From pairs of radar measurements at angles separated by 90 deg in azimuth the surface wind speed and direction may be inferred, though not uniquely. The character of the solutions for wind

speed and direction is displayed, as well as the nature of the ambiguities of these solutions. An economical procedure for handling such data is described, plus a criterion for the need for conventional (surface) data in order to resolve the ambiguities of solutions. Author

N75-30734*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

CLIMATIC CHANGE BY CLOUDINESS LINKED TO THE SPATIAL VARIABILITY OF SEA SURFACE TEMPERATURES

J. Otterman Apr. 1975 54 p refs Submitted for publication (NASA-TM-X-70941; X-910-75-54) Avail: NTIS HC $4.25 CSCL 04B

An active role in modifying the earth's climate is suggested for low cloudiness over the circumarctic oceans. Such cloudiness, linked to the spatial differences in ocean surface temperatures, was studied. The temporal variations from year to year of ocean temperature patterns can be pronounced and therefore, the low cloudiness over this region should also show strong temporal variations, affecting the albedo of the earth and therefore the climate. Photographs are included. Author

N75-30735# Stanford Research Inst., Menlo Park, Calif.

STUDY IN THE AREA OF SATELLITE METEOROLOGY. VOLUME 1. MESOSCALE WEATHER ANALYSIS AND PREDICTION Final Report, Jun. 1973 - Jul. 1974

Roy H. Blackmer, Jr., Paul A. Davis, Robert L. Mancuso, Sidney M. Serebreny, and Eldon J. Wieman Nov. 1974 134 p refs 3 Vol.

(Contract DAAD07-73-C-0317; SRI Proj. 2813)

(AD-A005035) Avail: NTIS CSCL 04/2

The basic research objectives were (1) to investigate new, long range uses of geosynchronous satellite data and (2) recommend a system design to implement the satellite-derived meteorological data. This system is to be known as the Meteorological Information System (MIS). This volume (Volume I) is concerned with the uses of satellite data. Emphasis has been concentrated on four facets of geosynchronous satellite data utilizations: fundamental needs pertinent to analysis of visible and infrared imagery (including nephanalysis), temperature information from infrared radiometers, cloud-motion vector analysis, and software requirements for analysis and forecasting. In each of the studied areas attention has been given to anticipated data and display requirements. Identification of problem areas requiring further research is included. GRA

N75-30736# Stanford Research Inst., Menlo Park, Calif.

STUDY IN THE AREA OF SATELLITE METEOROLOGY. VOLUME 2. SYSTEM DESIGN Final Report, Jun. 1973 - Jul. 1974

Leonard S. Gasiorek Sep. 1974 88 p 3 Vol.

(Contract DAAD07-73-C-0317)

(AD-A005036) Avail: NTIS CSCL 04/2

The report describes the design of a Meteorological Information System that uses satellite imagery as data to allow a meteorologist to generate a computer-assisted 24- or 48-hour forecast. The system can be operated either as a stand-alone facility or be integrated to any degree into an existing weather data-processing complex. Three different system designs are presented. A review of the required software programs and special operating system is given. The information processing flow and the size of satellite picture to be saved are the prime design factors dictating the choice and structure of digital hardware. Processed images are stored on a video disc, and data manipulation is done by the meteorologist working with the video images. System performance is estimated for one of the system designs. GRA

N75-30737# Stanford Research Inst., Menlo Park, Calif.

STUDY IN THE AREA OF SATELLITE METEOROLOGY. VOLUME 3. DATA COMPACTION AND IMAGE DISPLAY Final Report, 1 Jun. 1973 - 29 Jul. 1974

David G. Falconer Nov. 1974 75 p refs 3 Vol.

(Contract DAAD07-73-C-0317; SRI Proj. 2813)

(AD-A005037) Avail: NTIS CSCL 04/2

Meteorological satellites generate great volumes of digital imagery. For military field use, such data must be stored at minimum expense and with minimum equipment. To meet these requirements the satellite pictures should be carefully cropped to the geographical area of interest; the cropped data abstracted with a peripheral-cancellation algorithm; the spatially redundant portions of the imagery eliminated with transform encoding; and the temporally redundant portions of the imagery deleted with predictive encoding. Additional data compression is possible by noting the spectral redundancy that exists between the imagery gathered in the far-infrared, near-infrared, and visible. Further picture compaction is obtained by taking advantage of the psycho-physical characteristics of the human eye--e.g., its high sensitivity to spatial changes in luminance patterns and low sensitivity to spatial changes in chrominance patterns. The meteorological usefulness of multispectral satellite imagery depends importantly on the optical quality of the image display. GRA

N75-30738# Army Foreign Science and Technology Center, Charlottesville, Va.

EFFECT OF HUMIDITY CHANGES ON THE OPTICAL AND MICROPHYSICAL CHARACTERISTICS OF AN ATMOSPHERIC AEROSOL

L. S. Ivlev, N. K. Spazhkina, N. O. Grigorov, and E. L. Yanchenko 5 Sep. 1974 21 p refs Transl. into ENGLISH from Probl. Fiz. Atmosfery (USSR), no. 8, 1970 p 112-123

(AD-A005960; FSTC-HT-23-412-74) Avail: NTIS CSCL 04/2

The authors discuss the condensation growth of aerosol particles when the relative humidity of the atmosphere is less than 100%, and calculate the optical characteristics of the atmospheric aerosols on the basis of available data. GRA

N75-30739# Army Foreign Science and Technology Center, Charlottesville, Va.

SOME RESULTS OF FOG DROPLET SIZE MEASUREMENTS IN THE UKRAINIAN STEPPES

L. Z. Prokh 15 May 1974 17 p refs Transl. into ENGLISH from Tr. Nauchn. Issled. Gidrometeorologicheskii Inst. (Kiev), no. 42, p 26-35

(AD-A005969; FSTC-HT-23-0364-74) Avail: NTIS CSCL 04/2

Results of research carried out on fog droplets in the Ukrainian steppes is discussed. It was shown that the type of fog, its duration and the time at which it occurs plays an important part in the size of droplets. Basically, fogs in the warm sector contain droplets of 8-12 micrometers whereas radiation fogs contain droplets of less than 8 micrometers in diameter. GRA

N75-30740# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.

THE METEOROLOGICAL EQUATOR IN THE STRATOSPHERE AND MESOPHERE Environmental Research Papers

Arthur J. Kantor and Allen E. Cole 5 Dec. 1974 21 p refs (AF Proj. 8624)

(AD-A006398; AFCRL-GRP-495) Avail: NTIS CSCL 04/2

Fluctuations and periodic oscillations of the thermodynamic properties of the atmosphere between 25 and 80 km are analyzed in this paper to better define the structure of the tropical atmosphere. The nature of temperature and density variations at locations between 22 degrees N and 8 degrees S is examined by means of harmonic analysis. Amplitudes and phases of the annual and semiannual components of the temperature and density cycles indicate that the meteorological equator within the stratosphere and lower mesosphere lies south of Ascension Island. The paper is only one part of a larger investigation aimed at providing a set of mean monthly atmospheric models from the surface to 90 km at 15 degrees latitude intervals between equator and pole. GRA

N75-30741# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.

EVALUATION OF CLEAR AIR TURBULENCE DETECTION BY GROUND BASED RADARS, SPECIAL RAWINSONDES, AND AIRCRAFT, 1967 - 1971 Air Force Survey in Geophysics

Roland J. Boucher 1 Oct. 1974 104 p refs

(AF Proj. 6672)

(AD-A006033; AFCRL-AFSIG-295; AFCRL-TR-74-0489) Avail:

NTIS CSCL 04/1

During the winter operations, from 1967 to 1971, of Clear Air Turbulence (CAT) research at Wallops Island, Virginia, the Weater Radar Branch of Air Force Cambridge Research Laboratories observed eighteen cases of significant turbulence, defined as cases of light-to-moderate or moderate intensity. The report presents the meteorological data for each of these cases, consisting of synoptic sea level and upper air charts and rawinsonde data, observations of clear air echoes with powerful radars, and aircraft data which are used to indicate the present location and intensity of the turbulence. GRA

N75-30742# New York Univ., N.Y. Inst. of Mathematical Sciences.

STABILITY OF GEOSTROPHIC VORTICES ON A ROTATING SPHERE

Carlos A. Leiva Dec. 1974 218 p refs

(Grant AF-AFOSR-2728-74; ARPA Order 2774)

(AD-A008810; IMM-405; AFOSR-75-0508TR) Avail: NTIS CSCL 04/2

The original motivation for this study comes from the climatological observation of three semipermanent subtropical highs in each of the Northern and Southern Hemispheres. The stability under perturbation of the following four types of configurations of geostrophic vortices is studied: (a) N vortices of equal strength mu equally spaced on a circle of colatitude theta; (b) N vortices of equal strength mu equally space on a circle of colatitude theta, one vortex with strength (mu sub 0) at the pole; (c) the same distribution as in (a) but satisfying the boundary condition: vanishing normal velocity component at the equator; (d) the same distribution as (b) but satisfying the boundary condition: vanishing normal velocity component at the equator. GRA

N75-30743# Army Engineer Topographic Labs., Fort Belvoir, Va.

WORLD AREAS MORE HUMID THAN THE CANAL ZONE DURING THE WET SEASON. NOTE 3 OF STUDIES TO AID TECOM IN ANALYSES OF ENVIRONMENTAL RISKS TO MATERIEL

Howard L. Ohman Oct. 1974 16 p

(DA Proj. 1T1-62112-A-528)

(AD-A006021; ETL-RN-74-8) Avail: NTIS CSCL 04/2

The purpose of this study is to show the severity of humidity, expressed in terms of dewpoint, in the Canal Zone, site of the U.S. Army Tropic Test Center, in relation to other tropical areas. Extensive areas of the tropical and subtropical regions of the world experience a level of humidity stress during the month of highest mean dewpoint in excess of that reported at either Cristobal or Howard AFB, both in the Canal Zone, during the 7-month long wet season. Of these, southern Asia and the Amazon Basin of South America stand out as the most prominent areas of exceedance in terms of extent and contiguous coverage. As shown on the maps, the areas of dewpoint exceedance are most widespread when determined by comparison with a mean dewpoint value of 74F, the (T sub d average) at Howard AFB for all months of the wet season (May through November). The three maps illustrating the study can aid in determining the validity of test results obtained at sites within or near Cristobal and Howard AFB. GRA

N75-30744# Wisconsin Univ., Madison. Center for Climatic Research.

RECONSTRUCTION OF PAST CLIMATIC PROXY SERIES Final Report

John E. Kutzbach 30 Jan. 1975 25 p refs

(Grant AF-AFOSR-2407-72; ARPA Order 2221)

(AD-A006231; AFOSR-75-0177TR) Avail: NTIS CSCL 04/2

Reconstruction of past climates from pollen data, tree-ring data and historical data is described. The pollen-climate relationships cover the past 10,000 years and deal with North America and portions of Eurasia. Detailed climatic information from 1000-year records of annually laminated lake sediments and tree-ring records in central North America (Great Lakes area) is also described. GRA

N75-30745# Radio Corp. of America, Cape Kennedy, Fla.

A PROPOSAL FOR BALLOON BORNE WEATHER RADAR

Toxey A. Hall 29 Jan. 1974 41 p refs

(Contract F08606-74-C-0025)

(AD-A006040; RCA/TELTA-TR-74-048; AFETR-TR-75-08) Avail: NTIS CSCL 04/2

The report demonstrates the operation of the Family IID-7 balloon system for the detection of ground lightning caused forest fires in Alaska. Also included in the report are an engineering plan, diagrams, technical concepts, and cost analysis. GRA

N75-30746# Raven Industries, Inc., Sioux Falls, S.Dak. Flight Operations Dept.

SKYHOOK CHURCHILL, 1974 Interim Report, 29 Mar. 1974 - 17 Jan. 1975

Tom Pappas 19 Jan. 1975 98 p refs

(Contract N00014-74-C-0339; NR Proj. 211-187)

(AD-A005910; R-1274011) Avail: NTIS CSCL 04/2

The 1974 Churchill SKYHOOK program provided sufficient funding and balloons for a total of twelve successful flights. Raven provided a field crew, suspension and rigging hardware, aircraft and helicopter tracking, parachutes, balloon telemetry and control instrumentation, electronic tracking, and reports and documentation as necessary. The report describes individual flights, equipment used, flight data, and various program data. GRA

N75-30747# Army Cold Regions Research and Engineering Lab., Hanover, N.H.

LABORATORY STUDIES OF COLD FOG DISPERSAL BY COMPRESSED AIR

Thomas E. Lukow and James R. Hicks Dec. 1974 16 p refs

(DA Proj. 1T1-61102-B-52A)

(AD-A008866; CRREL-RR-327) Avail: NTIS CSCL 04/2

Two compressed air systems for glaciating supercooled clouds were studied in the laboratory. The first system used the sudden expansion of compressed air. The second system used a continuous flow of air through nozzles of various designs, of which the supersonic nozzle was found to be the most efficient. The data were obtained at an ambient temperature of -4C, but data for other temperatures and pressures were obtained and are presented in the text. GRA

N75-30748# North American Weather Consultants, Goleta, Calif.

SANTA BARBARA CONVECTIVE BAND SEEDING TEST PROGRAM. PHASE 2: 1970 - 1973 SUMMARY Final Report

Robert D. Eliott and John R. Thompson Mar. 1975 144 p

(Contract N000123-73-C-0755)

(AD-A009094; NWC-TP-5712) Avail: NTIS CSCL 04/2

The report presents the results (Phase II) of test-seeding convection bands in winter storms along the central and southern California coast. Both aerial and ground-based seeding were conducted on a randomized basis in approximately one half (44%) of the storms observed during the 1971-73 seasons. In addition, some test data from the 1970-71 season are included for the aerial seeding operations. The aerial seeding, using an AgI-NH4I-acetone solution, was conducted just west of Santa Barbara County with the nucleant being dispersed by a burner developed by the Naval Weapons Center. The primary mode of evaluation was by rainfall, with a test area of about 27,000 square kilometers containing 104 raingages available for analysis. GRA

N75-30749# Naval Weather Service Command, Washington, D.C.

SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS: INDONESIAN COASTAL MARINE AREAS. VOLUME 4: AREA 22 (NORTHWEST CELEBES SEA); AREA 23 (EAST CELEBES SEA); AREA 24 (NORTHEAST MOLUCCA SEA); AREA 25 (SOUTHEAST MOLUCCA SEA); AREA 26 (NORTHEAST BANDA SEA); AREA 27 (TIMOR NORTHWEST); AREA 28 (NORTH TIMOR SEA)

Apr. 1975 566 p

(AD-A009276) Avail: NTIS CSCL 04/2

The data contained in these tables were obtained from tape data Family 11 (TDF-11), Marine Surface observations. TDF-11 was primarily funded by the Naval Weather Service Command and selected by NWSD Asheville as the most comprehensive collection of marine surface observations from which to develop a series of coastal marine summaries. GRA

N75-30750# Naval Postgraduate School, Monterey, Calif.
FORMATION OF DISCONTINUITIES IN A STRATIFIED, ROTATING ATMOSPHERE Technical Report, Jul. 1973 - Jun. 1974
R. T. Williams and R. P. Kurth Mar. 1975 28 p refs
(AD-A009246; NPS-51WU75031) Avail: NTIS CSCL 04/2

The formation of discontinuities within internal gravity waves in a rotating Boussinesq atmosphere is investigated with a numerical model. The motion is bounded between two rigid horizontal boundaries, and heating and friction are neglected. Special sinusoidal initial conditions are used. The equations are integrated for a range of values of the initial Rossby (Ro) and Froude (F) numbers. Discontinuities are found when the following conditions are satisfied: F = or> 0.2, Ro = or> -- 0.2. These results are substantially different from those obtained with a one-layer fluid with a free upper surface. GRA

N75-30751# Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
A KINETIC ANALYSIS OF TROPICAL STORM BASED ON ATS CLOUD MOTIONS
T. Theodore Fujita and Jaime J. Tecson Aug. 1974 26 p refs
(Grant NOAA-04-3-022-8)
(COM-75-10581/7; SMRP-RP-125; NOAA-75041411) Avail: NTIS HC $3.25 CSCL 04B

The asymmetric structure of an incipient storm in the Atlantic Ocean was determined, using low-cloud velocities computed from the applications technology satellite (ATS 111) picture sequences. The investigation concerns the kinematic analysis of tropical storm Anna during July 26, 27, and 28, 1969 when it intensified into tropical storm stage in the vicinity of 10 degrees N and 35 degrees W, reportedly late on the 27th. The cross-equatorial flow from the Southern Hemisphere was responsible for providing the inflow to the storm while the Northern Hemisphere trade supplied the major contribution to the circulation around the storms. The inflow from the southern sector of the disturbance and the over-all circulation increased as the storm intensified. GRA

N75-30752# Naval Weather Service Command, Washington, D.C.
SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS. NORTH AMERICAN COASTAL MARINE AREAS, REVISED. ATLANTIC AND GULF COASTS. VOLUME 4, AREA 22: GUANTANAMO, AREA 23: KEY WEST, AREA 24: FORT MYERS, AREA 25: APALACHICOLA, AREA 26: PENSACOLA, AREA 27: NEW ORLEANS, AREA 28: GALVESTON, AREA 29: CORPUS CHRISTI
May 1975 643 p
(AD-A008889) Avail: NTIS CSCL 04/2

The report is part of a series of compilations which is regional in scope. It consists of climatological and air sea interface data in tabular form for specified water areas. GRA

N75-30753# Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
THE RESPONSE OF MASSACHUSETTS BAY TO WIND STRESS
Bruce B. Parker and Bryan R.& Pearce 28 Feb. 1975 109 p refs
(Grant NOAA-04-5-158-1)
(COM-75-10598/1; MITSG-75-2; NOAA-75041106) Avail: NTIS HC $5.25 CSCL 04B

In the Massachusetts Bay, the drift currents due to wind stress are of the same magnitude as the tidal currents. If one is to develop a predictive mathematical model describing transport mechanisms, accurate wind stress must be included. Since the strongest wind-driven currents are in the upper-most water layers, wind stress is important when considering the dispersion of buoyant pollutants. Wind stress on water also changes the sea level along a coast, causes storm surges, and generates waves. It is a vital cause of ocean circulation and affects atmospheric circulation. The final objective of this investigation is the determination of values for the wind stress coefficient and the demonstration of the effect of atmospheric stability on this coefficient. GRA

N75-30754# National Weather Service, Silver Spring, Md. Techniques Development Lab.
CLIMATOLOGY OF LAKE ERIE STORM SURGES AT BUFFALO AND TOLEDO
N. Arthur Pore, Herman P. Perrotti, and William S. Richardson Mar. 1975 33 p refs
(COM-75-10587/4; NOAA-TM-NWS-TDL-54;
NOAA-75041409) Avail: NTIS HC $3.75 CSCL 04B

The Techniques Development Laboratory of the National Weather Service compiled a climatology of storm surges at each end of Lake Erie. For this study, storm surge is defined as the departure of the lake level from the mean monthly lake level. Thirty-three years of lake level data for Buffalo, N. Y. and Toledo, Ohio were processed. The occurences of storm surges greater than two feet, both positive and negative, were put into classes at half-foot intervals for each month of the year. This information should be useful in determining the probabilities of specific storm surge heights and lake levels in the future. GRA

N75-30755# National Climatic Center, Asheville, N.C.
SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS FOR GREAT LAKES AREA. VOLUME 1: LAKE ONTARIO AND LAKE ERIE
Jan. 1975 213 p refs
(COM-75-10602/1; NOAA-75041809) Avail: NTIS HC $7.25 CSCL 04B

A climatic guide to thirteen major Great Lakes areas is presented in tabular form. Data are given in the following areas: weather occurrence by wind direction and hour; mean wind speed by direction and hour; mean cloud amount by wind direction; relative humidity by air temperature; wind direction by air temperature; means, extremes, and percentiles of air temperature; and occurrence of fog. Other topics covered include: sea height; monthly and annual percent frequencies and means of sea surface temperature; and monthly and annual sea level pressures. Author

N75-30756# National Weather Service, Fort Worth, Tex.
THE EFFECT OF INITIAL DATA UNCERTAINTIES ON THE PERFORMANCE OF STATISTICAL TROPICAL CYCLONE PREDICTION MODELS
Charles J. Neumann Mar. 1975 20 p refs
(COM-75-10483/6; NOAA-TM-NWS-SR-81;
NOAA-75040204) Avail: NTIS HC $3.25 CSCL 04B

Statistical prediction models in operational use of the National Hurricane Center have a potentially high degree of forecast skill on condition that these models are supplied with precise information on current and previous storm position and storm motion. Over the five-year period 1968 through 1972, the average error between the operational specification of initial storm position and that determined by a postseason analysis (positioning error) was about 27 nmi while the initial motion error was about 3.5 knots. This paper examines the specific impact of these data uncertainties on the performance of certain statistical models, and makes recommendations concerning modifications to the models to make their data requirements commensurate with the currently ability to provide such data. GRA

N75-30757# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
SEVERE LOCAL STORMS RESEARCH Final Report
Ernest M. Agee 28 Jan. 1975 16 p refs
(Grant NOAA-04-3-022-20)
(COM-75-10576/7; NOAA-75041601) Avail: NTIS HC $3.25 CSCL 04B

The purpose of the investigation was to determine the nature of the formation of wave-like features which are found by radar and by satellite cloud photography to occur in squall lines. An attempt was also made to interpret the relationship of these features to severe weather production by the squall line. Two additional abstracts are given concerning studies at Purdue on the dynamics of mammatus clouds (inferences of eddy viscosity associated with instabilities in the atmosphere) and aspects of the April 1974 Jumbo Tornado Outbreak (aspects and dynamic features of vortices). GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N75-30758*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SEA SURFACE DETERMINATION FROM SPACE: THE GSFC GEOID
F. O. Vonbun, J. McGoogan, J. Marsh, and F. Lerch Aug. 1975 14 p refs Presented at the 1974 USNC/URSI- IEEE Meeting, Boulder, Colo., 14-17 Oct.
(NASA-TM-X-70959; X-900-75-216) Avail: NTIS HC $3.25 CSCL 08J

The determination of the sea surface/geoid and its relative variation were investigated and results of the altimeter experiment on Skylab to test the geoid are discussed. The spaceborne altimeter on Skylab revealed that the sea surface of the world's oceans can be measured with an accuracy in the meter range. Surface variations are discussed as they relate to those computed from satellite orbital dynamics and ground based gravity data. The GSFC geoid was constructed from about 400,000 satellite tracking data (range, range rate, angles) and about 20,000 ground gravity observations. One of the last experiments on Skylab was to measure and/or test this geoid over almost one orbit. It was found that the computed water surface deviates between 5 to 20 m from the measured one. Further outlined are the influence of orbital errors on the sea surface, and numerical examples are given based upon real tracking data. Orbital height error estimates were computed for geodetic type satellites and are found to be in the order of 0.2 to 5 meters. Author

N75-30759# Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
WATER WEIGHTED CORER
Shale Niskin Feb. 1975 10 p
(Contract N00014-67-A-0201-0013)
(AD-A006272; UM-RSMAS-75005) Avail: NTIS CSCL 13/10

In order to overcome the intrinsic instability of the Kullenberg-type top-weighted piston corer, a weight stand has been designed which uses the high drag generated by a contained water mass for stability, as well as accruing the kinetic energy of this mass to provide the necessary driving force. GRA

N75-30760# SACLANT ASW Research Center, La Spezia (Italy).
A COMPARISON OF THREE SEDIMENT GRAIN-SIZE ANALYSIS TECHNIQUES
Giuliano Fierro, Giuseppe Maragliano, Mauro Piccazzo, and Briano Tonarelli 1 Apr. 1975 15 p refs
(AD-A008599; SACLANTCEN-SM-64) Avail: NTIS CSCL 08/10

Sediment grain sizes have been measured with an Andreasen's Pipette, an EEL Photo-Extinction Sedimentometer with an MSA Particle Size Analyser on samples taken from a deep sea core. The results obtained with the EEL Photo-Extinction Sedimentometer and the Andreasen's Pipette were in good agreement; the MSA Particle Size Analyser result did not agree with the other two results. GRA

N75-30761# Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
TIME/DEPTH RECORDER
Shale Niskin Feb. 1975 7 p
(Contract N00014-67-A-0201-0013)
(AD-A006474; UM-RSMAS-75010) Avail: NTIS CSCL 08/10

The time/depth recorder that biologists needed to study the sounding characteristics of gray whales had to be compact and self-contained. The design that has emerged meets these criteria; in addition, it is positively buoyant, can record for a twelve-hour period, and has a Xenon light to aid in recovery. GRA

N75-30762# Office of Naval Research, London (England).
EUROPEAN SYMPOSIUM ON OCEAN DATA ACQUISITION SYSTEMS
F. N. Spiess 5 Dec. 1974 27 p refs Conf. held at Southampton, Engl., 16-18 Sep. 1974
(AD-A006029; ONRL-C-8-74) Avail: NTIS CSCL 08/3

The European Ocean Data Acquisition Systems Symposium involved primarily northern European participants and focused its attention on systems involving buoys. Papers and discussion covered a variety of buoy types, small and large, as well as instrumentation, data transmission (heavy emphasis on satellite relay) and operational aspects. Geographically the North Sea was the center of attention, although work in other areas (all within a thousand mile radius of Southampton) was presented. GRA

N75-30763# Coast Guard Research and Development Center, Groton, Conn.
CHARACTERIZATION OF SLUSH ICE IN THE GREAT LAKES Final Report
James P. Welsh and Brian T. Kingsbury Nov. 1974 19 p
(AD-A006450; CGR/DC-34-74; USCG-D-45-75) Avail: NTIS CSCL 08/12

The purpose of the study was to identify characteristics of slush ice and to develop techniques for their measurement. Slush ice is a mixture of fresh water ice and water. It becomes an impediment to navigation when wind and water current transport the ice fragments into a restricted channel or harbor. The characteristics of slush ice identified and measured were draft, ice to water ratio (surface aspect only), and ice particle size distribution. Draft was measured using a sonar transducer set on the bottom of a channel and echoing off the underside of the slush ice. The water to ice ratio was obtained from photographs of slush ice taken from a helicopter. The ice particle size distribution was obtained by physically measuring ice particles in the field. GRA

N75-30764# Army Engineer Topographic Labs., Fort Belvoir, Va.
PHOTO-GEOMORPHOLOGY OF COASTAL LANDFORMS, CAT ISLAND, BAHAMAS, VOLUME 2
A. O. Lind Jan. 1974 53 p refs
(AD-A008954; ETL-SR-74-5-Vol-2) Avail: NTIS CSCL 08/6

The report provides the aerial imagery used in the analysis of the coastal landforms of Cat Island in the east-central Bahama Islands. Interpretive maps and a brief description of the significant aspects of the coastal terrain are presented. The report is intended to complement the author's published volume Coastal Landform of Cat Island, Bahamas: A Study of Holocene Accretionary Topography and Sea-Level Change but may also serve as an independent document for military geographic intelligence and general photo-interpretation of coastal terrains. GRA

N75-30765# Naval Civil Engineering Lab., Port Hueneme, Calif.
SEAFLOOR CONSTRUCTION EXPERIMENT, SEACON 1: AN INTEGRATED EVALUATION OF SEAFLOOR CONSTRUCTION EQUIPMENT AND TECHNIQUES Final Report, Dec. 1968 - Dec. 1972
T. R. Kretschmer, R. M. Beard, E. J. Beck, J. B. Ciani, and G. A. Edgerton Feb. 1975 171 p refs
(AD-A009097; CEL-TR-817) Avail: NTIS CSCL 13/10

A series of interrelated seafloor engineering experiments was conducted in 600 feet of water on the seafloor 7 miles south of Santa Barbara, California, between July 1969 and August 1972. The experiments involved the evaluation of equipment and techniques by the Civil Engineering Laboratory (CEL) at Port Hueneme, California. The Navy Seafloor Construction Experiment (SEACON) demonstrated a capability to construct operating facilities at the bottom of the ocean and pointed up deficient areas in the state of the art. The focal point of the SEACON I experiments was the construction and evaluation of an unmanned, one-atmosphere concrete structure placed at the 600-foot site. Experimental evaluations of hardware and techniques for site selection and investigation, seafloor construction, and structural and electrical elements were coordinated with the year-long seafloor testing of the concrete structure. The construction site was investigated using tools operated from towed vehicles and manned submersibles as well as surface vessels. In-situ tests to determine short- and long-term settlement behavior of model footings were performed. GRA

N75-30766# Environmental Prediction Research Facility (Navy), Monterey, Calif.

THE DELAWARE-DOBSON WAVE REFRACTION MODEL
K. Rabe Mar. 1975 46 p refs
(AD-A008841; EPRF-CP; Note-21) Avail: NTIS CSCL 08/3

A description of the Delaware-Dobson wave refraction model is provided, along with detailed running instructions. These include the data card setup, flow charts, and listings of all routines. Also, sample input card, and the expected outputs are given.
GRA

N75-30998 Forschungsanstalt der Bundeswehr fuer Wasserschall- und Geophysik, Bonn (West Germany).
INVESTIGATIONS OF SUMMER TIME THERMAL BOUNDARY LAYER WITH A THERMISTOR TOW CABLE IN THE BALTIC SEA [UNTERSUCHUNGEN DER SOMMERLICHEN TEMPERATURSPRUNGSCHICHT MIT EINEM THERMISTORSCHLEPPKABEL IN DER OSTSEE]
K.-H. Keunecke *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 109-126 refs In GERMAN (For availability see N75-30995 21-99)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-30767*# Scientific Translation Service, Santa Barbara, Calif.
THE INTRODUCTION OF MYCORRHIZAL FUNGI INTO FORESTED AREAS OF VERONEZH REGION (OBLAST)
V. Ya. Chastukhin Washington NASA Jul. 1975 22 p refs Transl. into ENGLISH from Tr. Compleksnoy Vauchnoy Ekspeditsii po Voprosam Dolozashchitnogo Lesorazvedeniya (USSR), v. 2, Issue 2, 1952 p 136-146
(Contract NASw-2483)
(NASA-TT-F-16481) Avail: NTIS HC $3.25 CSCL 06M

An investigation was made of mycoflora of the forest-stepp zone in the Veronezh region for several years. The practical results of mycorrhization of newly planted forest areas were discussed.
Author

N75-30768*# Kanner (Leo) Associates, Redwood City, Calif.
SPECIES OF FUNGI OF THE HYGROPHORACEAE FAMILY ON THE VELKA HORKA HILL NEAR MNICHOVO HRADISTE
J. Herink Washington NASA Sep. 1975 49 p refs Transl. into ENGLISH from Acta Musei'et Horti Balamci Bohemia Borealis, Sb. Severoceskeho Musea. Liberec. Sb. Severecesk Mus. Prirodinivedy (Czechoslovakia), v. 195, 1958 p 53-86
(Contract NASw-2790)
(NASA-TT-F-16492) Avail: NTIS HC $3.75 CSCL 06M

A detailed introduction is given, providing the geographical geological and ecological characterization of a site chosen in Bohemia. The main body of this article deals with the morphology and taxonomy of several fungi of the Hygrophoraceae family found in the given locale. The author gives very full descriptive data on several species of Hygrophoraceae (i.e., Hygrophorus, Camarophyllus, Camarophyllopsis, Godfrinia, Neohygrocybe, Hygrocybe and Gliophorus). He also proposes a new systematic classification of the sections and subsections of Godfrinia R. Maire, Neohygrocybe (gen. nov.), Hygrocybe (Fr.) P. Karst., and Gliophorus (gen. nov.).
Author

N75-30769*# Joint Publications Research Service, Arlington, Va.
SPACE GARDEN
N. Mishina Washington NASA Aug. 1975 5 p Transl. into ENGLISH from Pravada (Moscow), 2 Apr. 1975 p 6
(Contract NASA Order W-13183)
(NASA-TT-F-16421) Avail: NTIS HC $3.25 CSCL 06C

Closed cycle life support systems are discussed, followed by report on experiments already conducted in a vivarium.
Author

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-30770 British Library Lending Div., Boston Spa (England).
EFFECT OF 50-Hz FIELDS ON MAN
R. Hauf 19 May 1975 9 p Transl. into ENGLISH from ETZ, Ausg. B (Berlin), v. 26, no. 12, 1974 p 318-320
(BLL-CE-Trans-6689-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

The biological effects of electrical and electromagnetic fields on man were investigated. Parameters considered include reaction time, blood pressure, pulse, ECG, EEG, blood count, thrombocytes, reticulocytes, clotting time, and sedimentation rate. Test results show that under the experimental conditions of a 50 Hz alternating field, no harmful effects were noted. Apart from slight non-specific stimulation phenomena in the physiological range, no pathological changes were observed which could be attributed to the influence of the field. Both male and female subjects were studied.
E.H.W.

N75-30771*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 143
Jul. 1975 80 p refs
(NASA-SP-7011(143)) Avail: NTIS HC $4.00 CSCL 06E

This supplement to Aerospace Medicine and Biology (NASA SP-7011) lists 251 reports, articles and other documents announced during June 1975 in Scientific and Technical Aerospace Reports (STAR) or in International Aerospace Abstracts (IAA). The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued. In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.
Author

N75-30772*# General Electric Co., Houston, Tex.
SKYLAB IMSS CHECKLIST APPLICATION STUDY FOR EMERGENCY MEDICAL CARE Final Report
John G. Carl and Shiro Furukawa 15 Aug. 1975 95 p refs
(Contract NAS9-14442)
(NASA-CR-144394) Avail: NTIS HC $4.75 CSCL 06B

A manual is presented that provides basic technical documentation to support the operation and utilization of the Portable Ambulance Module (PAM) in the field. The PAM is designed to be used for emergency resuscitation and victim monitoring. The functions of all the controls, displays, and stowed equipment of the unit are defined. Supportive medical and physiological data in those areas directly related to the uses of the PAM unit are presented.
J.M.S.

N75-30773*# Scientific Translation Service, Santa Barbara, Calif.
COMPARATIVE ANATOMY OF THE AUDIO-VESTIBULAR ORGAN
H. M. DeBurlet Washington NASA Sep. 1975 239 p refs Transl. into ENGLISH from Handb. der Vergleichenden Anat. der Wirbeltiere, herausgegeben von Weiland Lois Bolk (West Germany), v. 2, 1934 p 1293-1432
(Contract NASw-2483)
(NASA-TT-F-16456) Avail: NTIS HC $7.50 CSCL 06P

The comparative anatomy of the inner ear and middle ear regions of vertebrates is presented based on research during the eighteenth, nineteenth and twentieth centuries up to 1934 by researchers all over the world. Over 400 references are cited.
Author

N75-30774*# California Univ., Berkeley. Research Station.
IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION Semiannual Status Report, 1 Jul. - 31 Dec. 1974
Nello Pace 31 Dec. 1974 76 p
(Grant NGR-05-003-470)
(NASA-CR-143375; SASR-5) Avail: NTIS HC $4.75 CSCL 06P

The time course of physiological changes that occur during the first 21 days of continuous bed rest was examined. The test involved a total of 14 men in the age range of 25 to 36 years. The subjects were divided into groups and tested on a staggered schedule. Results are presented. Author

N75-30775*# Scientific Translation Service, Santa Barbara, Calif.
MAPPING OF INDIVIDUAL CIRCADIAN RHYTHM
Oscar Oequist Washington NASA Aug. 1975 160 p refs Transl. into ENGLISH from Univ. of Goeteborg (Sweden) Thesis, Jul. 1970 p 1-128
(Contract NASw-2483)
(NASA-TT-F-16502) Avail: NTIS HC $6.25 CSCL 06P

Former models about the formation of the 24 hour rhythm in man, animals and plants are reviewed, according to which it is acquired, established and maintained by exogenic periodicities. The present investigation maps individual daily rhythms on the basis of experience, overt behavior and performance at various times of day. A group of 85 individuals were tested by means of questionnaires, and several control groups were included. The persons were divided into two extreme groups - the morning group and the evening group which were monitored for a month (diary). From each group, five individuals were subjected to performance measurements at two times during the day. It is concluded that individual daily rhythms are a fundamental characteristic which are affected only slightly by external life routine, are associated with schizothymia cyclothymia, are coupled with age and affect performance at different times of the day. Author

N75-30776*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF EXOGENOUS CATECHOLAMINES ON HEART RATE AND THERMOREGULATION IN THE HIBERNATING HEDGEHOG (ERINACEOUS EUROPAEUS L).
Annette Faure and Maurice Fontaine Washington NASA Aug. 1975 10 p refs Transl. into ENGLISH from Compt. Rend., Acad. des Sci. (Paris), ser. D, v. 280, 9 Jun. 1975 p 2559-2562
(Contract NASw-2790)
(NASA-TT-F-16533) Avail: NTIS HC $3.25 CSCL 06P

Hibernating hedgehogs were awakened by intracarotid injection of increasing doses of norepinephrine or L-Dopa. This awakening was prevented by inhibition of the peripheral effects of L-Dopa; these effects would therefore be provoked by the supply of exogenous catecholamines to the peripheral region, imitating the natural mobilization of catecholamine reserves. Author

N75-30777*# Joint Publications Research Service, Arlington, Va.
HIGHER NERVOUS ACTIVITY OF MAN: MOTIVATIONAL-EMOTIONAL ASPECTS
P. V. Simonov Washington NASA Aug. 1975 187 p refs Transl. into ENGLISH of the book "Vysshaya Nervnaya Deyatelnost Cheloveka: Motivatsionno-Emotsionalnyye Aspekty" Moscow, Nauka Press, 1975 p 1-175
(Contract NASA Order W-13183)
(NASA-TT-F-16453) Avail: NTIS HC $7.00 CSCL 06P

Results of experimental research on various manifestations of human higher nervous activity are reported. Principal attention is devoted to the motivational emotional aspect of higher nervous activity, including the applied significance of research in this area to efficient organization of labor, education, the study of art, and so on. Data are used as the foundation for summarizing a great deal of factual information accummulated by physiologists and psychologists. Author

N75-30778*# Baylor Univ., Houston, Tex. Dept. of Ophthalmology.
THE MARK 3 HAPLOSCOPE
Thomas A. Decker, Robert E. Williams, Christian L. Kuether, Noel D. Logar, and Diane Wyman-Cornsweet Washington NASA Sep. 1975 81 p refs
(Grants NGR-44-012-099; NGR-44-003-057)
(NASA-CR-2584) Avail: NTIS HC $4.75 CSCL 06B

A computer-operated binocular vision testing device was developed as one part of a system designed for NASA to evaluate the visual function of astronauts during spaceflight. This particular device, called the Mark 3 Haploscope, employs semi-automated psychophysical test procedures to measure visual acuity, stereopsis, phoria, fixation disparity, refractive state and accommodation/convergence relationships. Test procedures are self-administered and can be used repeatedly without subject memorization. The Haploscope was designed as one module of the complete NASA Vision Testing System. However, it is capable of stand-alone operation. Moreover, the compactness and portability of the Haploscope make possible its use in a broad variety of testing environments. Author

N75-30779# Council for Scientific and Industrial Research, Pretoria (South Africa).
STRAIN OF HUMAN BODIES PROTECTED BY SAFETY BELTS IN SIMULATED FRONTAL CRASHES
D. Kallieris and G. Schmidt 1974 21 p refs Transl. into ENGLISH from Z. Rechtsmedizin (West Germany), no. 74, 1974 p 31-42
(CSIR-Trans-1196) Avail: NTIS HC $3.25

Tolerance limits of the human body, protected by safety belt systems, to impact loads are studied in sled deceleration tests that simulate headon automobile collisions. Scanning oscillographic recordings of sled deceleration, blet strain and head velocity in relation to time, and high speed camera impact phase photographs show that tested restrain systems need improvement in the areas of head movement, shoulder belt widths and knee protection. G.G.

N75-30780# Office of Naval Research, London (England).
SYMPOSIUM ON TEMPERATURE REGULATION AND DRUG ACTION
A. R. Dawe and L. M. Libber 22 Jan. 1975 18 p Symp. held at Paris, 16-18 Apr. 1974
(AD-A006372; ONRL-C-2-75) Avail: NTIS CSCL 06/15

The report discusses 42 papers presented under the following session titles; General Aspects and Thermoregulation; Mechanisms of Fever; Monoamines and Thermoregulation; Thermogenesis and Brown Adipose Tissue; Adaptive Aspects of Thermoregulation; Pyrexia and Prostaglandins; Drugs and Thermoregulation; and Physico-Chemical Aspects of Thermoregulation. GRA

N75-30781# University of Southern Calif., Los Angeles. Dept. of Psysiology.
BLOOD FLOW AND PRESSURE TELEMETRY Final Scientific Report
Christopher M. Stevens and Roland D. Radar 21 Feb. 1975 29 p refs
(Grant AF-AFOSR-2190-72; AF Proj. 9777)
(AD-A008885; AFOSR-75-0509TR) Avail: NTIS CSCL 06/19

The past year's research concluded a two-year study of the renal hemodynamic adjustments of the military working dog in response to a variety of environmentally-induced stimuli chosen to produce both physical and emotional responses. The vascular reactivity of the kidney was the indicator of the relative amount of psychophysiological stress inherent in a given situation. Hemodynamic responses of the kidney were studied, using an implanted blood pressure and flow telemetry system activated by a radio frequency-sensitive switch. Renal blood flow was obtained by a pulsed ultrasonic flow detection system with the flow transducer cuff placed on the left renal artery, and aortic blood pressure was obtained from an intravascular pressure transducer implanted immediately below the left renal artery bifurcation. GRA

N75-30782# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
BIOLOGICAL INDIVIDUALITY OF MAN
C. Jelleff Carr, Kenneth D. Fisher, and John M. Talbot Dec. 1974 29 p refs
(Grant F44620-74-C-0077; ARPA Order 2808; AF Proj. 6110; AF Proj. 6813)

(AD-A008888; AFOSR-75-0522TR) Avail: NTIS CSCL 06/3

The report suggests that the concept of biological individuality is worthy of study as a means of identifying those persons who possess unique attributes or inadequacies for specific tasks or responsibilities. Many biological factors related to individual differences are known and can be quantified objectively and thus may permit the prediction of some performance capability of an individual. The background of work on biological individuality is reviewed, three examples are cited, and key investigators in these specific fields are identified. However, numerous other examples can be found to illustrate the effects of individual biological factors that impinge on human performance. The suggestions for future research emphasize the basic concerns for performance in a military environment that may reflect the expression of biological individuality. GRA

N75-30783# University of Southern Calif., Los Angeles. Dept. of Biological Sciences.

ABSTRACTION AND ENCODING OF SENSORY INFORMATION Final Report

Lewis Bishop 25 Jan. 1975 33 p refs

(Grant AF-AFOSR-2112-71; AF Proj. 9777)

(AD-A008929; AFOSR-75-0510TR) Avail: NTIS CSCL 06/16

The research program was designed toward the functional/anatomical description of the neural movement detection system with the end product an insight into how behavior can be described in the information processing of known anatomical nerve networks. The research concentrated on the processes of reception by photoreceptors, and the processing of visual information by interneurons in the optic lobe, brain and thoracic ganglion. For the first time a system of movement detectors has been identified. There are possibly as few as 30 cells per animal which are command fibers for the control of flights. The horizontal and vertical movement detection systems are distinct anatomically, physiologically and behaviorally. GRA

N75-30784# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

THE DEVELOPMENT OF A REAL-TIME ELECTROCARDIOGRAM ANALYZING SYSTEM USING THE POP-15 COMPUTER M.S. Thesis

Edwin M. Fujinaga and Dennis Majerski Dec. 1974 110 p refs

(AD-A008672; GE/BE/74-43) Avail: NTIS CSCL 06/5

The thesis describes the development and results of a real-time computer system for electrocardiographic analysis using the PDP-15 computer. The system was developed using algorithms that were previously developed at the Air Force Institute of Technology and the Cox Heart Institute. These algorithms use pattern recognition techniques in both the time domain and the spatial frequency domain. Data (electrocardiograms) for this project was obtained from patients interned in a Coronary Care Unit. Two hundred twelve 15 second electrocardiograms were analyzed. GRA

N75-30785# School of Aerospace Medicine, Brooks AFB, Tex.

EVALUATION OF RETINAL DAMAGE PRODUCED BY LONG-TERM EXPOSURE TO LASER RADIATION Interim Report, Apr. - Dec. 1974

William D. Gibbons and Ralph G. Allen Apr. 1975 15 p refs

(AF Proj. 6301)

(AD-A008769; SAM-TR-75-11) Avail: NTIS CSCL 06/18

The study reported here was designed with two objectives. The first objective was to determine whether or not photopigments may be involved in the production of nonthermal lesions, and the second objective was to extend argon ED50 measurements for nonthermal lesions to 1000-sec exposures. To accomplish the first objective, exposures were made for 120 seconds using a wavelength of 1060 nm. This wavelength, when absorbed at the retina, can produce a temperature rise but is inefficient in bleaching photopigments. Thus, lesions produced by these exposures should stem primarily from thermal changes. The results of these exposures were then compared to those obtained from exposure to a wavelength of 514.5 nm which readily interacts with photopigments. GRA

N75-30786# School of Aerospace Medicine, Brooks AFB, Tex.

ADVANCED SPATIAL DISORIENTATION TRAINING CONCEPTS Final Aeromedical Review, Jan. - Jun. 1974

Kent K. Gillingham Dec. 1974 35 p refs

(AD-A008768; SAM-Review-11-74; SAM-TR-74-58) Avail: NTIS CSCL 06/19

Different approaches to the problem of training pilots to cope with spatial disorientation are analyzed, with emphasis on those approaches using hardware (antivertigo trainers) specifically designed for such training. Antivertigo trainers are categorized according to function; i.e., as (1) demonstrators of vestibular and visual illusions, (2) demonstrators of spatial disorientation, or (3) trainers to eliminate, through practice, erroneous responses to disorienting stimuli. Simple control-system diagrams of various antivertigo trainers illustrate the critical concepts of identification of the controlled parameter, degree of motion-control-loop closure, cross-sensory-modality coupling, and relevance of vestibular stimulation to the control problem. Opinions regarding probabilities of transfer of the various types of ground-based training to inflight situations are discussed. GRA

N75-30787# National Academy of Sciences - National Research Council, Washington, D.C. Ad Hoc Committee on Electric Stimulation of the Brain

AN EVALUATION OF ELECTROANESTHESIA AND ELECTROSLEEP Final Report

14 Dec. 1974 61 p refs

(Contract FDA-70-22)

(PB-241305/2) Avail: NTIS HC $4.25 CSCL 06E

An assessment of information on the effectiveness and hazard of applying electric current to the skin of the head to produce general anesthesia and for therapeutic purposes, exclusive of electroconvulsive therapy. Review of the literature indicates that electricity should be considered a potentially useful adjunct in anesthesia and further investigation encouraged. Conflicting evidence of morphologic changes in the brain after electroanesthesia needs investigation. Subanesthetic or subconvulsive electric currents have not been scientifically demonstrated to induce sleep as a specific effector to produce other healthful effects in excess of those produced by placebo. Ninety-four references are included. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-30788*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.

PSYCHOPHYSICAL MODELS FOR SIGNAL DETECTION WITH TIME VARYING UNCERTAINTY Ph.D. Thesis

Eliezer Gai Jan. 1975 286 p refs

(Grant NGR-22-009-733)

(NASA-CR-137734) Avail: NTIS HC $8.75 CSCL 05J

Psychophysical models for the behavior of the human operator in detection tasks which include change in detectability, correlation between observations and deferred decisions are developed. Classical Signal Detection Theory (SDT) is discussed and its emphasis on the sensory processes is contrasted to decision strategies. The analysis of decision strategies utilizes detection tasks with time varying signal strength. The classical theory is modified to include such tasks and several optimal decision strategies are explored. Two methods of classifying strategies are suggested. The first method is similar to the analysis of ROC curves, while the second is based on the relation between the criterion level (CL) and the detectability. Experiments to verify the analysis of tasks with changes of signal strength are designed. The results show that subjects are aware of changes in detectability and tend to use strategies that involve changes in the CL's. Author

N75-30789# Illinois Univ., Savoy. Aviation Research Lab.

BASIC ATTENTION MEASURES AS PREDICTORS OF SUCCESS IN FLIGHT TRAINING

Robert A. North and Daniel Gopher Oct. 1974 11 p refs

(Contract F44620-70-C-0105; AF Proj. 9778)

(AD-A006385; ARL-74-14/AFOSR-74-9; AFOSR-75-0388TR)

Avail: NTIS CSCL 05/9

A two-stage study was conducted to assess the potential of a new methodological technique for measuring individual differences in basic attention capabilities and the validity of these differences in predicting success in flight training. A performance testing system included a digit-processing reaction-time task and a one-dimensional compensatory tracking task. Comparisons were made between separate and concurrent performances of these tasks, and simultaneous performances also included comparisons involving changes in task priorities. Results indicating consistent individual differences in basic attention capabilities suggest several dimensions for their description. GRA

N75-30790# Human Resources Research Organization, Alexandria, Va.

TRANSFER AND USE OF TRAINING TECHNOLOGY: A MODEL FOR MATCHING TRAINING APPROACHES WITH TRAINING SETTINGS

Edgar M. Haverland Oct. 1974 77 p refs

(Contract F44620-74-C-0007; AF Proj. 9778)

(AD-A005816; HUMRRO-TR-74-24; AFOSR-75-0330TR) Avail: NTIS CSCL 05/9

A model for evaluating training approaches or innovations in relation to the requirements, resources, and constraints of specific training settings was developed. The model consists of two parallel series of questions, one concerning the characteristics of the training approach under consideration, and one concerning the corresponding characteristics of the training settings (including the abilities and other characteristics of trainees, and the characteristics of the training content). The model has been evaluated by subjecting it to the criticism of training managers and curriculum designers in Air Force Technical Training Centers, and by applying it to a training approach and to a training setting. GRA

N75-30791# Union Carbide Corp., Tarrytown, N.Y.

COGNITIVE AND PSYCHOMOTOR PERFORMANCE DURING NOAA OPS 1 AND 2

T. C. Schmidt, R. W. Hamilton, Jr., G. Moeller (Naval Submarine Med. Research Lab.), and C. P. Chattin (Naval Submarine Med. Res. Lab.) 20 Dec. 1974 27 p refs Prepared in cooperation with Ocean Systems, Inc., Tarrytown, N.Y.

(Contracts N00014-74-C-0424; N00014-69-C-0346)

(AD-A005643; CRL-T-799) Avail: NTIS CSCL 06/19

The NOAA OPS project developed excursion procedures for shallow nitrogen habitats. Operational verification of the concept was carried out in two laboratory saturation dives using three subjects each. Cognitive and psychomotor performance was evaluated on the subjects under several conditions: at sea level; during normoxic nitrogen saturation exposures of seven-day duration each at pressures equivalent to 30, 60, 90 and 120 feet of sea water (fsw); on compressed air excursions from saturation to depths as great as 300 fsw; and on equivalent air dives as made from the surface in the unsaturated condition. Results indicated that divers can live and work in normoxic nitrogen habitats--to depths as great as 120 fsw for at least one week duration--at performance levels comparable to sea level efficiency. GRA

N75-30792# Office of Civilian Manpower Management, Arlington, Va.

AN INTEGRATED WORKLOAD AND MANPOWER PLANNING SYSTEM FOR THE NAVAL AIR REWORK FACILITY, NORTH ISLAND Research Report

E. S. Bres and R. J. Niehaus Nov. 1974 46 p refs Sponsored by the Navy

(RF55521101)

(AD-A006293; OCMM-RR-21) Avail: NTIS CSCL 05/9

The paper describes the application of a manpower management model to a large industrial facility within the Naval Shore Establishment, the Naval Air Rework Facility, North Island, San Diego, California. This test involved the use in the model of manpower requirements data developed from the NARF workload planning system. The various input collection procedures are described and the outputs are analyzed in terms of management decisions. GRA

N75-30793# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

OPTIMAL MULTIMODAL PARAMETER IDENTIFICATION IN THE STATE SPACE MODEL OF THE HUMAN OPERATOR M.S. Thesis

Raymond H. Faergeb, Jr. Dec. 1974 93 p refs

(AD-A008707; GE/EE/74-42) Avail: NTIS CSCL 05/8

A technique is developed which can be used to identify the j-dimensional hypersurface of a multimodal human operator model. The j is equivalent to the number of system parameters plus one for the parameters' performance. The technique uses a bounded random search to select the parameters which are used to calculate an output from the model. Parameters which produce an output that meets the performance criterion are stored; then, they are used as an input to a clustering algorithm. The clustering algorithm produces clusters or groupings of parameters which identify the model's hypersurface from which local maximums can be determined using existing techniques such as Newton-Raphson or gradient search. The local maximum with the best performance is considered the global maximum and the parameters associated with the global maximum are referred to as the optimal set of system parameters. One use of this technique is parameter tracking such as is required in human operator modeling over long periods of time or under changing tasks. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-30794# Joint Publications Research Service, Arlington, Va.

HABITABILITY OF SHIPS

S. A. Itsirelson and M. A. Razran 29 Jul. 1975 237 p refs Transl. into ENGLISH from the Book "Obitayemost Sudov" Leningrad, 1963 p 2-223, 265-268

(JPRS-65334) Avail: NTIS HC $7.50

The fundamentals of ship habitability, an examination of the factors which determine the conditions of man's stay aboard ship, and the characteristics of the effect of the environment on the human organism during sailing, are given. Author

N75-30795*# General Electric Co., Philadelphia, Pa. Space Div.

URINE SAMPLING AND COLLECTION SYSTEM OPTIMIZATION AND TESTING Final Report

G. L. Fogal, J. A. Geating, and M. G. Koesterer Jun. 1975 111 p

(Contract NAS9-13049)

(NASA-CR-144401; GE-75SDS4231) Avail: NTIS HC $5.25 CSCL 06B

A Urine Sampling and Collection System (USCS) engineering model was developed to provide for the automatic collection, volume sensing and sampling of urine from each micturition. The purpose of the engineering model was to demonstrate verification of the system concept. The objective of the optimization and testing program was to update the engineering model, to provide additional performance features and to conduct system testing to determine operational problems. Optimization tasks were defined as modifications to minimize system fluid residual and addition of thermoelectric cooling. Author

N75-30796# Royal Aircraft Establishment, Farnborough (England).

POSTURE AND SEAT DESIGN FOR THE CAR DRIVER

G. Preuschen and H. Dupuis May 1975 14 p refs Transl. into ENGLISH from German Report Presented at the Proc. of the Symp. on Sitting Posture, 1969

(RAE-Lib-Trans-1842; BR48208) Avail: NTIS HC $3.25

Theoretical ideas on the practical design of automobile seats are illustrated. Data cover work tasks and anthropometry data of drivers, sufficient adjustments of automobile seats to adapt to different body dimensions and changes in body position, and vibration isolation. Author

N75-30797*# Transemantics, Inc., Washington, D.C.
LIFE SUPPORT SYSTEMS ABOARD THE SOYUZ-18-SALYUT-4 FLIGHT
A. Ivakhnov Washington NASA Aug. 1975 7 p Transl. into ENGLISH from Izv. (USSR), 7 Jun. 1975 p 5
(Contract NASw-2792)
(NASA-TT-F-16500) Avail: NTIS HC $3.25 CSCL 06K

The general review of the Soyuz 18 Salyut 4 program includes a discussion on the life support systems aboard the Salyut 4 that reprocesses the water stored aboard the station: a special device was used for this in which the water was refiltered and treated with silver. The water supply is abundant; the previous cosmonauts drank approximately 100 liters during their month-long stay. Regenerated water is also being used. Meals are planned to provide approximately 3000 calories per person per day. Food products are all natural and preserved by means of sterilization; they are stored in a refrigerator. The air supply consists of 1000 thousand liters. The crew is also supplied with several medical kits, including disposable syringes with medication.
Author

N75-30798*# Telecare, Inc., Houston, Tex.
PORTABLE MEDICAL STATUS SYSTEM Final Report
Aug. 1975 142 p
(Contract NAS9-14334)
(NASA-CR-144411) Avail: NTIS HC $5.75 CSCL 06B

Electrical schematics and outline drawings of the portable medical status unit are presented along with recommendations for future units.
M.J.S.

N75-30799*# Stanford Research Inst., Menlo Park, Calif.
MANIPULATION BASED ON SENSOR-DIRECTED CONTROL: AN INTEGRATED END EFFECTOR AND TOUCH SENSING SYSTEM
J. W. Hill and A. J. Sword 1973 8 p refs Presented at 17th Ann. Human Factors Soc. Conv., Washington D. C., 16-18 Oct. 1973
(Contracts SNSN-63; NAS2-7507; Grant NSF GI-38100x)
(NASA-CR-143420) Avail: NTIS HC $3.25 CSCL 05H

A hand/touch sensing system is described that, when mounted on a position-controlled manipulator, greatly expands the kinds of automated manipulation tasks that can be undertaken. Because of the variety of coordinate conversions, control equations, and completion criteria, control is necessarily dependent upon a small digital computer. The sensing system is designed both to be rugged and to sense the necessary touch and force information required to execute a wide range of manipulation tasks. The system consists of a six-axis wrist sensor, external touch sensors, and a pair of matrix jaw sensors. Details of the construction of the particular sensors, the integration of the end effector into the sensor system, and the control algorithms for using the sensor outputs to perform manipulation tasks automatically are discussed.
Author

N75-30800# School of Aerospace Medicine, Brooks AFB, Tex.
CONTAMINANT EVALUATION OF HELICOPTER OXYGEN SYSTEM Progress Report, Mar. 1974 - Aug. 1974
Herman J. Kilian and Richard L. Miller Dec. 1974 13 p refs (AF Proj. 7164)
(AD-A006139; SAM-TR-74-59) Avail: NTIS CSCL 06/11

A new aircrew oxygen delivery system using multiple sodium chlorate oxygen generators was tested for contaminant offgassing to assure physiological compatibility under anticipated use conditions. Measurements were made of oxygen flow, temperature, pressure, purity, and contaminant analyses for chlorine, carbon monoxide, carbon dioxide, total hydrocarbons, and water vapor in the breathing oxygen. The system met all specifications for oxygen purity and contaminant content under both normal and emergency use conditions.
GRA

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N75-30801# Michigan Univ., Ann Arbor. Systems Engineering Lab.
A STUDY OF INFORMATION IN MULTIPLE-COMPUTER AND MULTIPLE-CONSOLE DATA PROCESSING SYSTEMS Interim Report, 1 Jul. 1973 - 1 Jul. 1974
K. B. Irani, M. F. Mitoma, M. F. Bauer, J. D. Mulla, and C. R. Sonnenburg Dec. 1974 124 p refs
(Contract F30602-73-C-0001; AF Proj. 5581)
(AD-A003644; RADC-TR-74-321) Avail: NTIS CSCL 09/2

This report documents the achievements from 1 July 1973 to 1 July 1974 of continuing research for the development and application of mathematical techniques for the analysis and optimization of computer systems. The material covers the following areas: performance evaluation, parallel processing, data management systems, associative processors, languages for parallel processors, machine instruction sets.
GRA

N75-30802# Wisconsin Univ., Madison. Mathematics Research Center.
THE AUGMENT PRECOMPILER. 1: USER INFORMATION Technical Summary Report
F. D. Crary Dec. 1974 55 p refs
(Contract DA-ARO(D)-31-124-462)
(AD-A006542; MRC-TSR-1469) Avail: NTIS CSCL 09/2

AUGMENT greatly facilitates the use of nonstandard data types in FORTRAN programs. AUGMENT accepts programs written in standard FORTRAN that has been extended by the addition of new data types, operators and/or Library functions. In addition to the program, AUGMENT requires a description of the new data types and the packages of subroutines and functions that support the additional operations. AUGMENT then translates the input program (containing nonstandard constructs) into standard FORTRAN with the nonstandard constructs translated into references to the routines in the supporting packages. AUGMENT is also helpful in converting between dialects of FORTRAN. This report details the information needed by the user of AUGMENT and the programmer who prepares the packages supporting nonstandard data types.
GRA

N75-30803# Texas Univ., Austin. Electronics Research Center.
A FLYING SPOT SCANNER SYSTEM Interim Technical Report
S. A. Underwood, D. H. Williams, P. Costa, and J. K. Aggarwal 11 Dec. 1974 72 p refs
(Contract F44620-71-C-0091; Grant NSF GK-42790; AF Proj. 6813)

(AD-A008900; TR-164; AFOSR-75-0474TR) Avail: NTIS CSCL 09/2

A flying spot scanner (FSS) system was designed and constructed to digitize color images from 35 mm transparencies. This system features random access operation and can output a maximum of 8 bits of intensity information with a resolution of 20 lines/mm for each of the red, blue and green channels. Each transparency may be digitized into a maximum of 4096 x 4096 points with a cycle time of 200 microsec/point. A flexible software system permits histogram and color triangle distributions to be outputted along with the color intensity, color hue, and color purity information. GRA

N75-30804# Army Electronics Command, Fort Monmouth, N.J.
AN ACCOUNT OF THE HEURISTICS IN THE CONCEPTUAL DESIGN OF A DATA PROCESSING SYSTEM FOR MILITARY INTELLIGENCE INFERENCE
Norman Lee Apr. 1975 224 p refs
(AD-A008891; ECOM-4307) Avail: NTIS CSCL 09/2

The state of the art in data processing systems for tactical military intelligence is storage and retrieval. The report is directed at creating a system for higher-level man-machine inference. This broad objective results in a dilemma because of the difficulty in making it a well posed problem. An heuristical method (the Eight-and-a-Half-Pold Way) for attacking this dilemma by means of seven overlapping interdisciplinary models and dichotomous systems policy pairings is disclosed. Consideration of the models leads to: A robust basis for introducing a priori intelligence, and information theory measure of performance for system control, and a flow-chart design. The design reflects the Blue-Red interactive coupling of warfare and is directed at exposing the military risk caused by intelligence production by comparing Game Theoretic and Bayesian style inferences. The report stresses heuristic chronology rather than system description and justification. Some insights on heuristics creativity in system engineering are described and justified. GRA

N75-30805# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAGNETIC DISC UNIT
18 Mar. 1975 6 p Transl. into ENGLISH from Mechanizace, Automatizace Administrativy (USSR), no. 8, 1973 p 324
(AD-A008631; FTD-HC-23-0981-75) Avail: NTIS CSCL 09/2

Magnetic disk units are briefly described along with units with exchangeable packs. Electron circuits are designed using integrated circuits and discrete semiconductor parts. M.J.S.

N75-30806# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A COMPUTER SYSTEM, PERFORMANCE MEASUREMENT PROGRAM M.S. Thesis
Edward F. Pleuler Dec. 1974 167 p refs
(AD-A008709; GE/EE/74-60) Avail: NTIS CSCL 09/2

Computer performance information is usually collected by three types of measurement tools: (1) accounting logs which are operating system routines that record the quantities of system resources used by each job, (2) hardware monitors which operate independently of the monitored host system and interface to the host system to record selected events or performance data, and (3) software monitors which are memory - resident programs that search operating system tables for meaningful data. The data from each tool can be implicitly or explicitly synchronized to the computer clock. A software program, written in FORTRAN 4, is used to consolidate the performance data from these tools and provide output summaries of user specified parameters. The evaluation time periods of the performance data are defined by the program user. The software program is organized into modules so that it can be used in different computer systems if a small portion of the program is recoded. GRA

N75-30807# Decisions and Designs, Inc., McLean, Va.
AUTOMATIC DATA PROCESSING STRATEGY STUDY. VOLUME 1: A SUMMARY OF THE FINDINGS Final Report
Mar. 1975 72 p
(Contract OFMP-AMD-74-1)
(PB-240903/5; GSA/OFMP/AMD-74/1) Avail: NTIS HC $4.75 CSCL 09B

The results are presented of a study of strategic issues relating to the acquisition, utilization, and management of computers in the Federal Government. Sixteen strategic policy issues were identified and examined in detail. The study approach involved in-depth elicitation sessions with representatives of key Federal Government agencies. Techniques of decision analysis were employed to provide a quantitative basis for rating of options by the participants, and collective judgements were reflected in the results. Conclusions were formulated with respect to each of the key ADP issues. Recommendations for new/revised ADP policies were then formulated as well as a plan for implementation of the recommendations. GRA

N75-30808# Decisions and Designs, Inc., McLean, Va.
AUTOMATIC DATA PROCESSING DATA STUDY. VOLUME 2: TECHNOLOGY, HISTORY AND EVALUATION Final Report
Mar. 1975 207 p
(Contract OFMP-AMD-74-1)
(PB-240904/3; GSA/OFMP/AMD-74/2) Avail: NTIS HC $7.00 CSCL 09B

For abstract, see N75-30807.

N75-30809# Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Computer Science.
ANALYSIS OF A FAMILY OF ALGORITHMS FOR THE EVALUATION OF A POLYNOMIAL AND SOME OF ITS DERIVATIVES
Mary Shaw and J. F. Traub 26 Feb. 1975 44 p refs
(Contract N00014-67-A-0314-0010; Grant NSF GJ-32111; NR Proj. 044-422)
(AD-A009250) Avail: NTIS CSCL 09/2

The authors have previously presented a new one parameter family of algorithms and a program for evaluating the first m derivatives of a polynomial of degree n. In this paper the authors analyze that family of algorithms and present practical algorithms for selecting optimal or good values of the parameter q. A program for selecting the optimal value of q under the constraint at q divides n-l is given. The authors also analyze a program that eliminates that constraint and a simple program that selects a good, but not always optimal, value of q. Bounds are derived on how close to optimal the good value will be. The above results apply for n = 12. The authors extend the results to all n by tabulating the cost function for n is less than or equal 12. Some open questions on extensions of our results are stated. GRA

N75-30810# Mitre Corp., Bedford, Mass.
ARCHITECTURES FOR SECURE COMPUTING SYSTEMS
L. Smith Apr. 1975 65 p refs
(Contract F19628-73-C-0001; AF Proj. 522G)
(AD-A009221; MTR-2772; ESD-TR-75-51) Avail: NTIS CSCL 09/2

The need for certifiable protection of information has been well established. This paper defines and describes architectural features of computers that would allow the effective construction of a secure computer system. Five large scale machines are compared with the identified architectural features. The machine judged most desirable for implementing a secure system is the Honeywell 6180. The other machines in the comparison are the Burroughs B6700, DEC System KI-10, IBM 370, and XDS Sigma 9. GRA

N75-30811# New York Univ., N.Y. Computer Research Lab.
DETERMINING THE MINIMUM AREA ENCASING RECTANGLE FOR AN ARBITRARY CLOSED CURVE
H. Freeman and R. Shapira Nov. 1974 28 p refs
(Grant AF-AFOSR-2755-75; AF Proj. 9769)
(AD-A008844; CRL-37; AFOSR-75-0537TR) Avail: NTIS CSCL 09/2

This report describes a method for finding the rectangle of minimum-area in which a given arbitrary plan cure can be contained. The method is of interest in certain packing and optimum layout problems. It consists of first determining the minimla-perimeter convex polygon that encloses the given curve and then selecting the rectangle of minimum area capable of containing this polygon. Three theorems are introduced to show

that one side of the minimum-area rectangle must be colinear with an edge of the enclosed polygon and that the minimum-area encasing rectangle for the convex polygon is also the minimum-area rectangle for the curve. GRA

N75-30812# Computer Corp. of America, Cambridge, Mass.
DATACOMPUTER PROJECT Semiannual Technical Report, 1 Jul. - 31 Dec. 1974
31 Dec. 1974 110 p refs
(Contract MDA903-74-C-0225; ARPA Order 2687)
(AD-A008877) Avail: NTIS CSCL 09/2

The Datacomputer system is being designed as a large-scale data storage utility to be accessed from remote computers on the Arpanet and, potentially, on other networks. The development is phased, with each successive release of the system offering increased capabilities to users. During the present reporting period, the third major release of the system became operational. This release, while still primitive in many respects, is providing service for a wide range of applications. GRA

N75-30813# National Bureau of Standards, Washington, D.C. Office of Standard Reference Data.
COMPUTER APPLICATIONS AT THE ECUADORIAN INSTITUTE OF STANDARDIZATION (INEN): OBSERVATIONS AND RECOMMENDATIONS Final Report
Apr. 1975 17 p refs
(PB-241237/7; NBSIR-75-649) Avail: NTIS HC $3.25 CSCL 09B

Specific suggestions for computer applications at the Ecuadorian Bureau of Standards (INEN) are presented. The suggestions, based on observations and discussion cover editing and typesetting of Ecuadorian standards, data storage and retrieval, and statistical analysis of experimental data. GRA

N75-30814# National Bureau of Standards, Washington, D.C.
GUIDE FOR THE USE OF INTERNATIONAL SYSTEM OF UNITS (SI) IN FEDERAL INFORMATION PROCESSING STANDARD PUBLICATIONS
Robert E. Rountree, Jr. 1 Jan. 1975 5 p
(COM-75-50278/1; FIPS-PUB-34) Avail: NTIS MF $2.25; SOD HC as C13.52:34 CSCL 09B

The use of SI (International System of Units) within the United States is increasing. The Secretary of Commerce has established the policy that publications of the Department will provide dual dimensions to the extent practicable. The Federal Information Processing Standards (FIPS) Program strives to improve the utilization of ADP equipment, goods and services within the Federal Government through the establishment of uniform Federal automatic data processing standards. Accordingly, this guideline will be used in the preparation of all new FIPS PUBS and existing FIPS PUBS when revised. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-30815# National Aerospace Lab., Tokyo (Japan).
COMPARATIVE STUDY OF COUNTING METHODS BY DIGITAL SIMULATION
Kosaburo Yamane, Kazuyuki Takeuchi, Koichi Ono, and Hiroo Asada Feb. 1975 10 p refs In JAPANESE; ENGLISH summary
(NAL-TR-408) Avail: NTIS HC $3.25

Various counting methods were compared and the effect of eliminating small amplitude variations on the frequencies was determined. Using a digital computer, two kinds of Gaussian noise, low pass filtered and band pass filtered, were simulated and the frequencies were counted by level crossing count, peak count, zero-crossing peak count, and range-mean count methods. The first methods showed a good agreement with Rice's theoretical solution in the higher level, but differed in the lower level. When the eliminated amplitude was increased the differences between the three methods decreased, but the differences of the three methods from Rice's solution increased. Range-mean counts were sensitive to the magnitude of the eliminated amplitude and the effect of eliminating small amplitude varied with the shape of power spectral density and the magnitude of the amplitude counted. Also, comparison was made between the range-mean counts and the amplitude frequencies calculated from the methods of counting. Author

N75-30816# Australian Post Office Research Labs., Melbourne.
SIMPLE APPROXIMATIONS TO DIGITAL ERROR RATE DUE TO INTERSYMBOL INTERFERENCE AND GAUSSIAN NOISE
J. V. Murphy Oct. 1974 15 p refs
(Rept-6929) Avail: NTIS HC $3.25

Two intersymbol interference bounds are derived for multilevel and pseudoternary digital systems. The bounds are evaluated for specific impulse responses and for an ensemble of random channels where each impulse sample obeys a Gaussian distribution with a standard deviation which decreases according to a negative - exponential law. This model of the ensemble of channels enables a general examination of the merits of the two bounds to be made. While the exponential bound gives good overall accuracy, the integral approximation is superior for low signal-to-noise ratios. The two bounds provide an accurate approximation to digital error rate. Author

N75-30817*# Decision Science, Inc., San Diego, Calif.
AN ADAPTIVE MANEUVERING LOGIC COMPUTER PROGRAM FOR THE SIMULATION OF ONE-ON-ONE AIR-TO-AIR COMBAT. VOLUME 1: GENERAL DESCRIPTION Final Report
George H. Burgin, Lawrence J. Fogel, and J. Price Phelps Washington NASA Sep. 1975 74 p refs
(Contract NAS1-9115)
(NASA-CR-2582) Avail: NTIS HC $4.25 CSCL 09B

A technique for computer simulation of air combat is described. Volume 1 decribes the computer program and its development in general terms. Two versions of the program exist. Both incorporate a logic for selecting and executing air combat maneuvers with performance models of specific fighter aircraft. In the batch processing version the flight paths of two aircraft engaged in interactive aerial combat and controlled by the same logic are computed. The realtime version permits human pilots to fly air-to-air combat against the adaptive maneuvering logic (AML) in Langley Differential Maneuvering Simulator (DMS). Volume 2 consists of a detailed description of the computer programs. Author

N75-30818# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A SOFTWARE TOOL FOR DIGITAL CONTROLLER M.S. Thesis
Ferdinand Q. Hartman Nov. 1974 168 p refs
(AD-A008677; GE/EE/74-48) Avail: NTIS CSCL 09/2

The structure of a software tool for aiding in the design of digital control systems is developed. Structure in this case refers to a flow diagram whose building blocks are algorithms. The algorithms included in the software structure are discussed with the objective of conveying an understanding of the algorithm and of facilitating the coding of the algorithm. The software structure is divided into two main branches, the transfer-function and the state-variable branch. Included in both branches are algorithms for obtaining the exact and the approximate, discrete, model of a continuous system. Both branches include algorithms for analyzing the discrete system or for modifying it to improve system performance. Actual coding of the transfer-function branch of the software was begun. A discussion of this software is included. GRA

N75-30819# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
VARIABLE ARCHITECTURE MULTIPROCESSOR (VAMP), AS AN EMULATOR M.S. Thesis
Russell A. Sotkovsky Nov. 1974 165 p refs
(AD-A008661; GE/EE/74-63) Avail: NTIS CSCL 09/2

The use of AFIT's Variable Architecture Multiprocessor (VAMP) as an emulator is investigated. Several hardware and firmware modifications which either correct deficiencies in the present system or enhance its emulation capabilities are

synthesized. A general set of guidelines for using VAMP as an emulator is then developed. This general treatment is finally followed by an implementation example for the HP 2108. GRA

N75-30820# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
A COMPUTER PROGRAM TO LEARN PRODUCTION SYSTEMS USING A SEAMANTICNET
Charles L. Hedrick Jul. 1974 174 p refs
(Contract F44620-73-C-0074)
(AD-A009142; AFOSR-75-0603TR) Avail: NTIS CSCL 09/2

This paper describes a program that learns production systems. Its productions are designed to produce characterizations of symbol strings. They are learned by having the user present example strings together with the correct characterization. There are two interesting ways to look at the program. On the one hand, the task it is doing is certainly inductive, in the psychologist's meaning of the work. In fact it seems to be a sufficiently powerful sort of induction that it can be used to simulate most other tasks that psychologists would call inductive. Thus the design of the program and the exposition that follows has been influenced by a number of programs that do various specific inductive tasks. On the other hand, since a language for production systems is itself a powerful programming language, this program is doing automatic programming. There are crucial differences between this program and conventional automatic programming systems, but many of the same considerations apply to their design. GRA

N75-30821# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
STRENGTHENING CUTS FOR MIXED INTEGER PROGRAMS
Egon Balas Feb. 1975 34 p refs
(Contract N00014-67-A-0314-0007; Grant NSF GP-37510; NR Proj. 047-048)
(AD-A009269; RR-359; WP-23-74-75) Avail: NTIS CSCL 12/2

The authors give a method for strengthening cutting planes for pure and mixed integer programs. The method improves the coefficients of the integer-constrained variables, while leaving unchanged those of the continuous variables. The authors first state the general principle on which the method is based; then the authors apply it to the class of cuts that can be obtained from disjunctive constraints. Finally, simple procedures are given for calculating the improved coefficients of cuts in this class, and illustrate them on numerical examples. GRA

N75-30822# George Washington Univ., Washington, D.C.
COMPUTABILITY OF GLOBAL SOLUTIONS TO FACTORABLE NONCONVEX PROGRAMS. PART 1: CONVEX UNDERESTIMATING PROBLEMS
Garth P. McCormick 7 Jan. 1975 38 p refs
(Grant AF-AFOSR-2504-73)
(AD-A009223; Serial-T-307; AFOSR-75-0562TR-Pt-1) Avail: NTIS CSCL 12/2

For nonlinear programming problems which are factorable, a computable procedure for obtaining tight underestimating convex programs is presented. This is used to exclude from consideration regions where the global minimizer cannot exist. GRA

N75-30823# IBM Federal Systems Div., Gaithersburg, Md.
STRUCTURED PROGRAMMING SERIES. VOLUME 9: MANAGEMENT DATA COLLECTION AND REPORTING Final Report
Ronald L. Smith 24 Oct. 1974 128 p refs
(Contract F30602-74-C-0186; AF Proj. 5550)
(AD-A008640; RADC-TR-74-300-Vol-9) Avail: NTIS CSCL 09/2

This report contains the results of the analysis performed on the question, what data should be collected on programming projects, and how should it be reported to assist management in planning, controlling, and directing programming activities. The question was applied to system development phases - definition, design, implementation, and evaluation. Related questions of how to collect the data required for project management, including project cost data, and what is the cost of collecting this data, are also addressed. GRA

N75-30824# IBM Federal Systems Div., Gaithersburg, Md.
STRUCTURED PROGRAMMING SERIES. VOLUME 10: CHIEF PROGRAMMER TEAM OPERATIONS DESCRIPTION Final Report
Barbara S. Barry and John J. Naughton 22 Jan. 1975 53 p refs
(Contract F30602-74-C-0186; AF Proj. 5550)
(AD-A008861; RADC-TR-74-300-Vol-10) Avail: NTIS CSCL 09/2

This technical report contains job descriptions for each member of a chief programmer team as required for SOW Task 4.1.10. Also included for background information is a description of the chief programmer team approach to software development, a description of the team composition, and member qualifications. GRA

N75-30825# European Research Office, London (England).
IMPLEMENTATION LANGUAGES FOR REAL-TIME SYSTEMS. PART 3: COMMAND AND CONTROL LANGUAGES; SPECIFIC COMMENTS
P. H. Enslow, C. A. R. Hoare (Queens Univ., Belfast), Jacob Palme (Swedish Natl. Defense Res. Inst.), David Parnas (NRL), Ian Pyle (York Univ.), and Brian Wichmann 15 Apr. 1975 80 p Sponsored by Army Res. and Develop. Group
(AD-A009081; ERO-2-75-Pt-3) Avail: NTIS CSCL 09/2

The report contains background papers for a U.S. Army Seminar on Standard Programming Languages for Command and Control Systems held at Fort Belvoir, VA, 24-25 April, 1975. Topics covered in the 21 papers include both technical and management aspects of language design and standardization. General comments are presented as well as specific observations on the successful standardization of two languages, SIMULA and CORAL 66. The three major divisions of the material are Vol. 1 - Standardization --- Its Implementation and Acceptance; Vol. 2 - General Comments (on language design with emphasis on real-time); and Vol. 3 - Command and Control Languages --- Specific Comments (primarily on CS-4 with one paper on JOVIAL and one on a summary of CORAL 66). GRA

N75-30826# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
USER PROGRAM SYSTEMS FOR SMALL COMPUTERS
I. Nagy, Buday L. Sarkadi, and T. Gorbe Feb. 1975 25 p refs Transl. into ENGLISH from Meres Automat. (Hungary), v. 22, no. 1, 1974 p 12-16
(AD-A008806; FTD-HC-23-0753-75) Avail: NTIS CSCL 09/2

User program systems based on an arbitrary grouping are reviewed: a description of a characteristic member of each of the groups is included. Topics discussed include programming languages, real time operations, data processing techniques, and input/output routines. M.J.S.

62 COMPUTER SYSTEMS

Includes computer networks.

N75-30827# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
DYNAMIC FILE ASSIGNMENT IN A COMPUTER NETWORK. PART 2: RANDOM RATES OF DEMAND
Adrian Segall Feb. 1975 30 p refs
(Grant AF-AFOSR-2273-72; AF Proj. 9769)
(AD-A008645; ESL-P-590-Pt-2; AFOSR-75-0559TR-Pt-2) Avail: NTIS CSCL 09/2

The problem of dynamic file allocation in a computer network is treated in the case when the time-pattern of the file demand rates is not perfectly known in advance to the designer. Instead, only a prior distribution and a statistical behavior are assumed, and the rates have to be estimated on-line from the incoming requests. It is shown that these estimates are sufficient statistics for the optimal control. The equations giving the control laws as a function of the current estimates and the present location of the file are obtained. GRA

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N75-30828*# Notre Dame Univ., Ind. Dept. of Electrical Engineering.
SOME LONG, RATE ONE-HALF, BINARY CONVOLUTIONAL CODES WITH AN OPTIMUM DISTANCE PROFILE AND THE SYSTEMATIC VERSUS NONSYSTEMATIC CODE QUESTION
Rolf Johannesson 19 Aug. 1975 8 p refs Sponsored in part by the Swedish Board for Technical Develop.
(Grant NsG-5025)
(NASA-CR-143353; EE-756) Avail: NTIS HC $3.25 CSCL 09B

A tabulation is given of long systematic and long quick-look-in (QLI) nonsystematic rate R = 1/2 binary convolutional codes with an optimum distance profile (ODP). These codes appear attractive for use with sequential decoders. Simulations for two of the new codes are reported and confirm Massey's conjecture that systematic and non-systematic codes of the same rate yield nearly identical computational and error probability performance with sequential decoding when the number of digits transmitted in the tail of the encoded frame is the same for both codes. Author

N75-30829# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
UNDERSTANDING SIMPLE PICTURE PROGRAMS Technical Report
Ira Goldstein Sep. 1974 230 p
(Contracts N00014-70-A-0362-0003;
N00014-70-A-0362-0005; NSF C-40708)
(AD-A005907; AI-TR-294) Avail: NTIS CSCL 09/2

A computer monitor MYCROFT is described that understands simple programs by generating commentary, discovering plans and debugging mistakes. The interplay between procedural and declarative knowledge is analyzed and a description of various planning paradigms and debugging techniques is provided. GRA

N75-30830# Maryland Univ., College Park.
XAP USER'S MANUAL
Kenneth C Hayes, Jr. Jan. 1975 125 p
(Contract F44620-72-C-0062)
(AD-A008794; TR-348; AFOSR-75-0543TR) Avail: NTIS CSCL 09/2

This report documents the XAP picture handling system, which is a drum or disk oriented system implemented on the Univac 1108. GRA

N75-30831# Maryland Univ., College Park. Computer Science Center.
THRESHOLD SELECTION TECHNIQUES, 5
Joan S. Weszka and Azriel Rosenfeld Feb. 1975 30 p refs
(Contract F44620-72-C-0062)
(AD-A008793; TR-349; AFOSR-75-0542TR) Avail: NTIS CSCL 09/2

Some further methods of sharply localizing the valley between two peaks on a histogram of picture gray levels are investigated. These methods are based on histogramming the gray levels of just those picture points at which the value of some digital gradient operator lies in a high percentile range. The thresholds obtained are not the same as those found with an earlier, Laplacian-based method, but they appear to be equally satisfactory. Outlining of the objects can be accomplished by outputting a narrow range of near-threshold gray levels as black, and all gray levels outside this range as white. GRA

N75-30832# Systems Control, Inc., Palo Alto, Calif.
ADAPTIVE ESTIMATION AND DUAL CONTROL WITH APPLICATIONS TO DEFENSE COMMUNICATIONS SYSTEM CONTROLS Final Report
Edison Tse, Robert E. Larson, and Yaakov Bar-Shalom Feb. 1975 91 p refs
(Contract F44620-74-C-0026; AF Proj. 9769)
(AD-A008924; AFOSR-75-0584TR) Avail: NTIS CSCL 12/1

Adaptive linear filters with the capability of tracking nonstationary noise statistics have been developed. These algorithms offer potentially improved solution methods for problems with significant nonlinearities in the system and measurement equations, high-dimensional problems, and problems in which the noise statistics are not exactly known. The application to a precision pointing and tracking problem for a telescope has been carried out to illustrate the potential benefits of an adaptive estimation algorithm. The simulation results show a sizable reduction in the pointing error compared to a non-adaptive filter. The previously developed dual control algorithm has been successfully applied to a missile guidance problem. Some further theoretical work on dual control has also been performed. It has been shown that the certainty equivalence property holds for a general class of problems if and only if the control has no dual effect. GRA

N75-30833# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
CONTROL FOR LARGE SCALE AND UNCERTAIN SYSTEMS Interim Report, 1 Jan. 1974 - 1 Jan. 1975
Michael Athans and Sanjoy K. Mitter 1 Mar. 1975 38 p refs
(Grant AF-AFOSR-2273-72; AF Proj. 9769)
(AD-A008998; ESL-IR-589; AFOSR-75-0552TR) Avail: NTIS CSCL 12/1

The research activities are described in the sequel under the following headings: nonlinear stochastic systems; filtering of stochastic delay differential systems; performance bounds for nonlinear estimation problems--(cone-bounded nonlinearities and estimation bounds, (bounds using information and rate-distortion measures); filtering with false measurements; stochastic control--(observer based compensators, (control of finite-state finite-memory stochastic systems); adaptive control; Failure detection methods; a geometric approach to nonlinear stochastic process analysis; estimation and control problems in computer networks. GRA

N75-30834# Washington Univ., Seattle. Dept. of Mathematics.
NONLINEAR OPTIMIZATION AND GENERALIZED LAGRANGE MULTIPLIERS Interim Report
R. T. Rockafellar 26 Feb. 1975 7 p refs
(Grant AF-AFOSR-2269-72; AF Proj. 9749)
(AD-A008989; AFOSR-75-0548TR) Avail: NTIS CSCL 12/2

This report briefly describes the contents of 7 papers written under this grant during the past year in the areas of nonlinear programming, stochastic programming and optimal control. GRA

N75-30835# Maryland Univ., College Park. Computer Science Center.
THRESHOLD SELECTION, 4
Joan S. Weszka and Azriel Rosefeld Oct. 1974 36 p refs
(Contract F44620-72-C-0062)
(AD-A008792; TR-336; AFOSR-75-0541TR) Avail: NTIS CSCL 09/2

If a picture contains dark objects on a light background, or vice versa, the objects can be separated from the background by thresholding the picture. A good place to choose the threshold is at the average gray level of those picture points where the value of some difference operation is high. Another standard method of choosing a threshold is to examine the histogram of gray levels that occur in the picture. If this has two peaks, corresponding to the gray level ranges of object points and background points, then a good place to choose the threshold is at the bottom of the valley between these peaks. Mason et al recently describes a method of deepening this valley bottom, to make the choice of threshold easier. This method was tested on the pictures mentioned above; it yielded reasonable thresholds, but the valley deepening effect was not as strong as that obtained using other methods. GRA

N75-30836# Maryland Univ., College Park. Computer Science Center.
HISTOGRAM MODIFICATION TECHNIQUES
Robert A. Hummel Sep. 1974 43 p refs
(Contract F44620-72-C-0062)

(AD-A008791; TR-329; AFOSR-75-0540TR) Avail: NTIS CSCL 09/2

The theory of histogram modification of continuous real-valued pictures is developed. It is shown that the transformation of gray levels taking a picture's histogram to a desired histogram is unique under the constraint that the transformation be monotonic increasing. Algorithms for implementing this solution on digital pictures are discussed. A gray level transformation is useful for increasing visual constrast, but may destroy some of the information content. It is shown that solutions to the problem of minimizing the sum of the information loss and the histogram discrepancy are solutions to certain differential equations, which can be solved numerically. GRA

N75-30837# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.

COLLECTED PAPERS ON THE LEARNING AND RECOGNITION OF STRUCTURED PATTERNS

Frederick Hayes-Roth and David J. Mostow Jan. 1975 92 p refs

(Contract F44620-73-C-0074)

(AD-A009143; AFOSR-75-0606TR) Avail: NTIS CSCL 09/2

This collection of four papers presents many of the major findings in the authors research related to the representation, recognition, and learning of structured patterns. The first paper presents an introduction to the problems of representation and recognition of structured patterns and suggests several directions for further research. One of these suggestions concerns a distributed processing network for pattern recognition. In the second paper (co-authored by D. J. Mostow), such a network is developed for use as a syntax system for speech understanding. The last two papers are concerned specifically with the learning problems encountered in the framework of structured patterns. GRA

N75-30838# Massachusetts Inst. of Tech., Cambridge.

PROGRAM RESTRUCTURING FOR VIRTUAL MEMORY SYSTEMS Interim Scientific Report

Jerry W. Johnson Mar. 1975 226 p refs

(Contract N00014-70-A-0362-0006; Proj. MAC)

(AD-A009218; MAC-TR-148) Avail: NTIS CSCL 09/2

The problem area addressed in this report is program restructuring, a method of reordering the relocatable sectors (subroutine and data modules) of a program in its address space to increase the locality of the program's reference behavior, thereby reducing the number of page fetches required for its execution in a virtual memory system. Theoretical upper and lower (optimum) bounds are derived for the paging performance of programs over all partitions of relocatable sectors into pages. Program restructuring techniques are developed which use intersector reference models based on sector working sets and sector stack distances. These intersector reference models identify the local reference behavior, and clustering procedures are developed that use this local reference behavior to rearrange sectors into pages such that significant improvement in paging performance is obtained. Results of measurements of paging performance obtained in the computer laboratory are discussed. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-30839*# Ohio State Univ. Research Foundation, Columbus. Dept. of Aeronautics and Aeronautical Engineering.

THE APPLICATION OF THE GENERAL ENERGY EQUATION: A UNIFIED APPROACH TO MECHANICS Final Report, 1 Apr. 1973 - 31 Aug. 1975

Cecil D. Bailey 29 Aug. 1975 14 p refs Submitted for publication

(Grant NGR-36-008-197)

(NASA-CR-143346) Avail: NTIS HC $3.25 CSCL 12A

A brief review is presented of the investigation on the application of the general energy equation; a status report on pending publications is included. Author

N75-30840*# Clemson Univ., S.C. Mechanical Engineering Dept.

NUMERICAL METHODS FOR EVALUATING THE DERIVATIVES OF EIGENVALUES AND EIGENVECTORS M.S. Thesis

Yee-Yeen Chu Dec. 1974 45 p refs

(Grant NGR-41-001-027)

(NASA-CR-132734) Avail: NTIS CSCL 12A

Two numerically efficient methods for computing the derivatives of eigenvalues and eigenvectors were developed. Exact expressions for these derivatives were first derived and evaluated by an algebraic method; then the approximate values of the derivatives were calculated cyclically by an iterative method. The iteration method may be employed for finding all the derivatives for a self-adjoint system. For a non self-adjoint system, this method may converge for the first partial derivative of the largest eigenvalue and its corresponding eigenvector. Numerical examples are given for these two methods, and the results are compared with those in the literature. The numerical accuracy was established, and the computational effectiveness is indicated. The methods are expected to be useful in automated design procedure for dynamic structures, especially for systems with large degrees of freedom. Author

N75-30841*# Kanner (Leo) Associates, Redwood City, Calif.

ON THE ASYMPTOTIC PROPERTIES OF THE SOLUTIONS OF THE THIRD-ORDER LINEAR DIFFERENTIAL EQUATION

M. Gregus Washington NASA Sep. 1975 15 p refs Transl. into ENGLISH from Ann. Mat. Pura Appl. (Italy), series 4, v. 63, 1963 p 1-10

(Contract NASw-2790)

(NASA-TT-F-16539) Avail: NTIS HC $3.25 CSCL 12A

Some results concerning the asymptotic properties of solutions without zeros for the third order binomial differential equation are generalized to include third order differential equations of the form $y' + 2A(x)y' + A'(x) + b(x)y = 0$. Author

N75-30842*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

TWO-DIMENSIONAL CONVOLUTE INTEGERS FOR OPTICAL IMAGE DATA PROCESSING AND SURFACE FITTING

Thomas R. Edwards and Randall D. Knight (Calif. Univ., Berkeley) 28 May 1975 35 p refs

(NASA-TM-X-64949) Avail: NTIS HC $3.75 CSCL 12A

An approach toward low-pass, high-pass and band-pass filtering is presented. Convolution coefficients possessing the filtering speed associated with a moving smoothing average without suffering a loss of resolution are discussed. Resolution was retained because the coefficients represented the equivalance of applying high order two-dimensional regression calculations to an image without considering the time-consuming summations associated with the usual normal equations. The smoothing (low-pass) and roughing (high-pass) aspects of the filters are a result of being derived from regression theory. The coefficients are universal integer valves completely described by filter size and surface order, and possess a number of symmetry properties. Double convolution lead to a single set of coefficients with an expanded mask which can yield band-pass filtering and the surface normal. For low order surfaces (0,1), the two-dimensional convolute integers were equivalent to a moving smoothing average. Author

N75-30843# Stanford Univ., Calif. Dept. of Computer Science.

NOTES ON GENERALIZED DEDEKIND SUMS

Donald E. Knuth Feb. 1975 47 p refs

(Contracts N00014-67-A-0112-0057; N00014-70-A-0362-0001; NR Proj. 044-402)

(AD-A008804; SU-STAN-CS-75-480) Avail: NTIS CSCL 12/1

Generalized Dedekind sums sigma(h,k,c) have proved to be useful in connection with the analysis of linear congruential random number generators. This paper introduces a simple algorithm for the calculation of generalized Dedekind sums using only integer arithmetic. A second algorithm, for calculating the value of c which maximizes or minimizes sigma(h,k,c) when h and k

are given, is used to deduce optimal a priori bounds on sigma(h,k,c). Finally the reciprocity law for Dedekind sums is shown to be a consequence of a much more general reciprocity law. GRA

N75-30844# Chicago Univ., Ill. Center for Mathematical Studies in Business and Economics.
FINITE AND CONSTRUCTIVE CONDITIONS FOR A SOLUTION TO f(x) = 0
F. J. Gould Mar. 1975 26 p refs Prepared in cooperation with North Carolina Univ.
(Contract N00014-67-A-0285-0019; NR Proj. 047-095)
(AD-A009105; CMSBE-7515; TR-4) Avail: NTIS CSCL 12/2

In R sup I, if a continuous function has opposite signs at the end point of an interval, then the function has a zero in the interval. If the function has a nonvanishing derivative at a zero, then there is an interval such that the function has opposite signs at the end points. Extension to R sup N relates the existence of a zero of a function to its behavior at a finite number of points in terms of opposite sign conditions analogous to those in R sup I. The sufficient conditions for the existence of a zero will be necessary when the function has a nonsingular Jacobian matrix at the zero. The sufficiency proof is constructive and provides a computational procedure for finding an approximate solution f(x) = 0. These results have implications for questions relating to other problems such as finding fixed points of continuous functions and solutions to the complementarity problem. GRA

N75-30845# Miami Univ., Oxford, Ohio.
APPROXIMATIONS TO THE DISTRIBUTIONS OF THE TRACES OF COMPLEX MULTIVARIATE BETA AND F MATRICES Scientific Interim Report
P. R. Krishnaiah and F. J. Schuurmann Oct. 1974 107 p refs
(Contract F33615-71-C-1463; AF Proj. 7071)
(AD-A006153; ARL-74-0123) Avail: NTIS CSCL 12/1

In this report, the authors have approximated the distribution of the trace of the complex multivariate beta matrix with Pearson Type 1 distribution. Using this approximation, the authors have tabulated approximate percentage points of the distribution of the trace of the multivariate beta matrix for several values of the parameters. The authors have also approximated the distribution of the trace of the complex multivariate F matrix with Pearson Type 4 distribution for some values of the parameters and Pearson Type 6 distribution for some other values of the parameters. The applications of the results of this paper in the area of multiple time series are also discussed. GRA

N75-30846# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
AN INTEGRAL-INTERPOLATORY ITERATIVE METHOD FOR THE SOLUTION OF NON-LINEAR SCALAR EQUATIONS
Boleslaw Kacewicz Jan. 1975 15 p refs
(Contract F44620-73-C-0074; ARPA Order 2466)
(AD-A008811; AFOSR-75-0561TR) Avail: NTIS CSCL 12/1

Iterative solutions to nonlinear equations were investigated. An interpolatory-integral method is defined which uses integral information and which has maximal order of convergence equal to s+3. A numerical analysis is included. Author

N75-30847# Purdue Univ., Lafayette, Ind.
FORMULAE FOR THE ASYMPTOTIC DISTRIBUTION HOTELLING'S TRACE UNDER VIOLATIONS
K. C. S. Pillai and Nashat B. Saweris Jan. 1975 39 p refs
(Contract F33615-72-C-1400; AF Proj. 7071)
(AD-A008796; ARL-75-0005) Avail: NTIS CSCL 12/1

An asymptotic formula is derived for the nonnull distribution of Hotelling's trace statistic for testing the hypothesis of the equality of the covariance matrices of two multivariate normal populations. The study is further extended to the case where one of the sample covariance matrix is distributed as noncentral Wishart and the other sample covariance matrix is distributed as central Wishart. GRA

N75-30848# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
COMPUTATIONAL PROBLEMS RELATED TO THE GALTON-WATSON PROCESS
Marcel F. Neuts Feb. 1975 58 p refs
(Grant AF-AFOSR-2350-72; AF Proj. 9769)
(AD-A008999; Mimeo-Ser-402; AFOSR-75-0497TR) Avail: NTIS CSCL 12/1

An algorithm to compute the probability distributions of the successive generation sizes in a Galton-Watson process is presented. The distribution of the number of offspring of each individual is assumed to be of phase type. A probability distribution is of phase type if it can be identified as the distribution of the time till absorption in an absorbing finite Markov chain with appropriate initial conditions. A detailed analysis of the error due to truncation is given, as well as an application in a problem related to the M/G/1 queue. A second algorithm deals with the distribution of the maximum generation size before extinction. Several theorems on probability distributions of phase type are proved. GRA

N75-30849# Missouri Univ., Kansas City. Dept. of Mathematics.
SOME REMARKS ON UNIFORM ASYMPTOTIC EXPANSIONS FOR BESSEL FUNCTIONS Interim Report
Yudell L. Luke 1974 15 p refs
(Contract AF-AFOSR-2520-73; AF Proj. 9749)
(AD-A008719; AFOSR-75-0359TR) Avail: NTIS CSCL 12/1

The uniform asymptotic expansion of the modified Bessel function of the first kind is given. A polynomial was determined by use of a recurrence equation which is in the form of a difference - differential - integral equation. As a consequence, these coefficients are not easily evaluated and the calculation becomes more cumbersome as k increases. It is shown that the above expansion series can be rearranged to satisfy a difference equation of order four, but there are only three terms as the coefficient of one of the terms is always zero. The Hankel functions were handled in a similar fashion. Author

N75-30850# Missouri Univ., Kansas City.
ON GENERALIZED GAUSSIAN QUADRATURE
Yudell L. Luke, Bing Yuan Ting, and Marilyn J. Kemp 1975 20 p refs
(Grant AF-AFOSR-2520-73)
(AD-A008720) Avail: NTIS CSCL 12/1

Results of previous investigations were extended to develop a generalized interpolation formula from which we derive a generalized Gaussian quadrature scheme to include an arbitrary number of preassigned mode(s). If (a,b) is the interval of integration and if the preassigned mode is at, a, or at both, a, and b, then the integration formulas often go by the names of Radau and Lobatto respectively. Error analyses were applied and numerical examples are included to manifest the efficiency of these analyses for Gaussian, Radau, and Dobatto quadrature schemes. M.J.S.

N75-30851# California Univ., Santa Barbara. Dept. of Electrical Engineering.
COMPARISON OF FOUR ON-LINE IDENTIFICATION METHODS FOR MULTIVARIABLE SYSTEMS
Lawrence W. Nelson and Edwin B. Stear 1974 8 p refs
(Grant AF-AFOSR-2166-72; AF Proj. 9769)
(AD-A008729; AFOSR-75-0555TR) Avail: NTIS CSCL 12/1

This paper presents the results of a comparison of four methods for on-line identification of discrete time, linear, time invariant, multivariable systems. The methods chosen for comparison are, the extended Kalman filter, instrumental variables method, extended least squares and stochastic approximations. These methods are applied to both a multivariable system as well as a single input single output system. The computational properties of the methods are compared as well as their convergence properties. Various trade offs between the methods are pointed out. GRA

N75-30852# California Univ., Los Angeles. Dept. of System Sciences.
WHITE NOISE VERSUS WIENER PROCESS Interim Report
A. V. Balakrishnan 1975 5 p refs Presented at Conf. on Inform. Sci. and Systems, John Hopkins Univ., 1975
(Grant AF-AFOSR-2492-73; AF Proj. 9769)
(AD-A008644; AFOSR-75-0554TR) Avail: NTIS CSCL 12/1

Continuous time stochastic system models involving a Wiener

process model for the additive noise on the observed process are inappropriate in actual use when nonlinear Ito integrals in the observed data have to be instrumented, and thus much of current non-linear filtering theory is of questionable practical utility. White noise models would appear to be more appropriate and this is illustrated by a canonical problem in system identification, both in terms of band-limited approximation of Ito integrals and in terms of direct white noise integrals. GRA

N75-30853# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF THE FINITE ELEMENT METHOD FOR DETERMINING GREEN'S FUNCTIONS M.S. Thesis
James D. Evans Mar. 1975 67 p refs
(AD-A008670; GEP/PH/75-4) Avail: NTIS CSCL 12/1

The purpose of this report was to investigate the feasibility of using the finite element method for determining Green's functions. The problems investigated had analytical solutions and numerical results were compared with an exact answer. The Green's function found by finite differences and by finite elements were then compared. GRA

N75-30854# University of Southern Calif., Los Angeles. Dept. of Aerospace Engineering.
INTERPOLATIVE SPLINE FILTERS Interim Report
Hussein Mohamed Youssef Jan. 1975 101 p refs
(Grant AF-AFOSR-2141-71; AF Proj. 9769)
(AD-A008979; AFOSR-75-0558TR) Avail: NTIS CSCL 12/1

An optimal phase demodulation problem is resolved by the numerical synthesis of the optimal nonlinear filter. The synthesis is achieved by representing the relevant conditional density of phase and phase rate by multiple dimensional interpolative splines under tension. This realization technique is compared in terms of speed of estimate production, estimate and conditional density accuracy with other realization schemes, point mass cyclic, and Fourier realization. A complete Monte Carlo program for this method is given as well as Monte Carlo performance. GRA

N75-30855# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
RESOLUTION SPACE, NETWORKS AND NON-SELF-ADJOINT SPECTRAL THEORY Interim report
Richard Saeks Feb. 1975 15 p refs
(Grant AF-AFOSR-2631-74)
(AD-A008643; AFOSR-75-0363TR) Avail: NTIS CSCL 12/1

Research directed at the application of modern non-self-adjoint spectral theory to formulate firm foundations and generalizations of the frequency domain methods classically used by network and system designers is reviewed. Specific applications considered include a generalized Nyquist criterion, analysis and synthesis of stochastic networks and systems, transmission line networks with feedback, and network design. GRA

N75-30856# Air Force Academy, Colo. Frank J. Seiler Research Lab.
STUDIES OF MODIFICATIONS TO THE ITERATED EXTENDED KALMAN FILTER Final Report, Feb. 1972 - Apr. 1975
Ronald E. Janosko Apr. 1975 44 p refs
(AF Proj. 7904)
(AD-A008775; SRL-TR-75-0007) Avail: NTIS CSCL 12/1

In any nonlinear estimation problem modifications can often be made to the standard iterated extended Kalman filter that will in some sense improve the performance of the filter. Several mutations to the standard filter are studied for a problem that is quadratic in the measurement nonlinearity. A nonlinear navigation satellite problem is used as an example. In general, the Kalman gain becomes either excessive or insufficient. The changes to be incorporated attempt to overcome these difficulties. All changes, both successes and failures, are given in this report. The results of numerous computer simulations are included for all modifications inspected. GRA

N75-30857# Brown Univ., Providence, R.I. Div. of Applied Mathematics.
AN ABSTRACT FRAMEWORK FOR APPROXIMATE SOLUTIONS TO OPTIMAL CONTROL PROBLEMS GOVERNED BY HEREDITARY SYSTEMS
H. T. Banks and J. A. Burns 1974 18 p refs
(Grants AF-AFOSR-2078-71; DA-ARO(D)-31-124-73-G130; NSF GP-28931; AF Proj. 9769)
(AD-A008723; AFOSR-75-0493TR) Avail: NTIS CSCL 12/1

General projection methods for nonhomogeneous linear functional differential equations results for such semigroups (e.g., Trotter's theorem) are used to develop a general framework for obtaining approximate solutions of the original FDE. Convergence results are easily established. Applications to optimal control of linear FDE are discussed. In particular, the original infinite-dimensional problem is replaced by a projected finite-dimensional problem which is more easily solved. Convergence of solutions of these finite-dimensional problems to solutions of the original problem is obtained. GRA

N75-30858# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ABOUT SOME FUNCTIONS OF HYPERGEOMETRIC TYPE, WHICH ARE ENCOUNTERED IN MECHANICS
E. S. Vozhdaev 26 Feb. 1975 27 p refs Transl. into ENGLISH from Uch. Zap. Tsentr. Aerogidrodinamicheskii Inst. (USSR), v. 1, no. 6, 1970 p 134-141
(AD-A008635; FTD-MT-24-0381-75) Avail: NTIS CSCL 12/1

Hypergeometric functions and their properties were investigated along with the reversibility of the integral into another integral. Recurrence formulas are given for the functions, and their expressions are presented through polynomials, elementry transcendental functions, and complete elliptic integrals. Formulas for differentiation and integration are included. M.J.S.

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-30859*# Tennessee Univ., Knoxville. Electrical Engineering Dept.
ADAPTIVE STATISTICAL PATTERN CLASSIFIERS FOR REMOTELY SENSED DATA Final Report
R. C. Gonzalez, M. O. Pace, and H. S. Raulston Jun. 1975 16 p refs
(Contract NAS8-30878)
(NASA-CR-143922; TR-EE/CS-75-10) Avail: NTIS HC $3.25 CSCL 12A

A technique for the adaptive estimation of nonstationary statistics necessary for Bayesian classification is developed. The basic approach to the adaptive estimation procedure consists of two steps: (1) an optimal stochastic approximation of the parameters of interest and (2) a projection of the parameters in time or position. A divergence criterion is developed to monitor algorithm performance. Comparative results of adaptive and nonadaptive classifier tests are presented for simulated four dimensional spectral scan data. Author

N75-30860# Sheffield Univ. (England). Dept. of Probability and Statistics.
STABLE SEQUENCES AND THE RANDOM INDICES LIMIT PROBLEM
D. J. Scott Sep. 1974 20 p refs
(RR-158/DJS-1) Avail: NTIS HC $3.25

The notion of sequences of biprobabilities and of random elements which are stable with respect to a beta-field of events is considered. Conditions were found for the existence of a random measure generating a particular biprobability, and the theory of stable convergence was applied to the random indices limit problem, using two different methods. M.J.S.

N75-30861*# Rice Univ., Houston, Tex. Dept. of Mathematical Sciences.
NONPARAMETRIC MAXIMUM LIKELIHOOD ESTIMATION OF PROBABILITY DENSITIES BY PENALTY FUNCTION METHODS
G. F. DeMontricher (Princeton Univ., N. J.), R. A. Tapia, and J. R. Thompson Aug. 1974 37 p refs Presented at 37th Ann. Meeting of the Inst. of Mathematical Statistics, Edmonton, Canada, 15 Aug. 1974 Sponsored by ONR

(Contract NAS9-12776; NR Proj. 042-283)
(NASA-CR-144384; Rept-275-025-016) Avail: NTIS HC $3.75 CSCL 12A

When it is known a priori exactly to which finite dimensional manifold the probability density function gives rise to a set of samples, the parametric maximum likelihood estimation procedure leads to poor estimates and is unstable; while the nonparametric maximum likelihood procedure is undefined. A very general theory of maximum penalized likelihood estimation which should avoid many of these difficulties is presented. It is demonstrated that each reproducing kernel Hilbert space leads, in a very natural way, to a maximum penalized likelihood estimator and that a well-known class of reproducing kernel Hilbert spaces gives polynomial splines as the nonparametric maximum penalized likelihood estimates. Author

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N75-30862*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
IMPACT OF COVERAGE ON THE RELIABILITY OF A FAULT TOLERANT COMPUTER
Salvatore J. Bavuso Washington Sep. 1975 25 p
(NASA-TN-D-7938; L-10050) Avail: NTIS HC $3.25 CSCL 09B

A mathematical reliability model is established for a reconfigurable fault tolerant avionic computer system utilizing state-of-the-art computers. System reliability is studied in light of the coverage probabilities associated with the first and second independent hardware failures. Coverage models are presented as a function of detection, isolation, and recovery probabilities. Upper and lower bonds are established for the coverage probabilities and the method for computing values for the coverage probabilities is investigated. Further, an architectural variation is proposed which is shown to enhance coverage. Author

N75-30001* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
APPLICATION OF A NEW CRITERION FOR MODELING SYSTEMS
Lawrence W. Taylor, Jr. *In* AGARD Methods for Aircraft State and Parameter Identification May 1975 9 p refs (For availability see N75-29997 21-01)
CSCL 12B

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-30863*# Alabama A & M Univ., Normal. Dept. of Physics.
TRANSITION RADIATIONS IN X-RAY REGION Summary Report
M. C. George Jan. 1975 28 p refs
(Grant NsG-8001)
(NASA-CR-143381) Avail: NTIS HC $3.75 CSCL 20H

The theory of production of radiations in the transoptical region by the passage of high energy charged particles through the interface of two media is discussed. Based on the theoretical model, calculations are made for electrons of selected energy range passing through Mylar. Author

N75-30864# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DISTRIBUTION OF PRESSURE IN AN IMPULSE MAGNETIC FIELD WITHIN BILLETS TAKING ACCOUNT OF WAVE PROCESSES
Ya. M. Batkilin 6 Dec. 1974 17 p refs Transl. into ENGLISH from Politekhnicheskii Inst., Kharkov. Vestnik (USSR), v. 53, no. 1, 1971 p 24-30
(AD-A005999; FTD-HC-23-2586-74) Avail: NTIS CSCL 13/8

Stresses in material in the case of magnetoimpulse method of processing metal are calculated. Radial stresses throughout the thickness of a material for the case of free deformation have a nonalternating character. With a decrease in frequency of discharge the values of radial stresses decrease and this should reduce preliminary cold hardening of the material. GRA

N75-30865# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELECTROMAGNETIC WAVE PROPAGATION THROUGH COMPOSITE LOSSY STRUCTURES M.S. Thesis
Thomas B. Lindahl Dec. 1974 77 p refs
(AD-A008669; GE/EE/74-53) Avail: NTIS CSCL 20/14

A mathematical model was derived to determine the propagation constant of normally incident electromagnetic energy through a dielectric honeycomb loaded with a lossy material. Tests were conducted across a frequency band of 2.6 GHz to 11.0 GHz measuring both phase shift and attenuation. Results of the tests were compared to the theoretical properties of the dominant mode, the HE sub 11 mode. At the lower end of the frequency band tested, the HE sub 11 mode was found to have phase shift and attenuation within 5% of the experimental data, but as frequency increased, the accuracy of the model decreased due to the presence of higher order modes. Formulas for wave impedance, effective permeability, and effective permittivity for each mode were also derived on the basis of the model. GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N75-30866*# Hamilton Standard, Windsor Locks, Conn.
STUDY OF NOISE SOURCES IN A SUBSONIC FAN USING MEASURED BLADE PRESSURES AND ACOUSTIC THEORY Final Report
Donald B. Hanson Washington NASA Aug. 1975 138 p refs
(Contract NAS1-12505)
(NASA-CR-2574) Avail: NTIS HC $5.75 CSCL 20A

Sources of noise in a 1.4 m (4.6 ft) diameter subsonic tip speed propulsive fan running statically outdoors are studied using a combination of techniques. Signals measured with pressure transducers on a rotor blade are plotted in a format showing the space-time history of inlet distortion. Study of these plots visually and with statistical correlation analysis confirms that the inlet flow contains long, thin eddies of turbulence. Turbulence generated in the boundary layer of the shroud upstream of the rotor tips was not found to be an important noise source. Fan noise is diagnosed by computing narrowband spectra of rotor and stator sound power and comparing these with measured sound power spectra. Rotor noise is computed from spectra of the measured blade pressures and stator noise is computed using the author's stator noise theory. It is concluded that the rotor and stator sources contribute about equally at frequencies in the vicinity of the first three harmonics of blade passing frequency. At higher frequencies, the stator contribution diminishes rapidly and the rotor/inlet turbulence mechanism dominates. Two parametric studies are performed by using the rotor noise calculation procedure which was correlated with test. In the first study, the effects on noise spectrum and directivity are calculated for changes in turbulence properties, rotational Mach

number, number of blades, and stagger angle. In the second study the influences of design tip speed and blade number on noise are evaluated. Author

N75-30867*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
NUMERICAL STUDY OF SOUND PROPAGATION IN A JET FLOW
Sharon L. Padula and Chen-Huei Liu Washington Sep. 1975 21 p refs
(NASA-TN-D-8012; L-10249) Avail: NTIS HC $3.25 CSCL 20A

An improved computer oriented solution method for problems involving the propagation of sound through a nonuniform jet flow is developed. The method seeks to optimize the use of computer resources such as core storage space and central memory time. Complete formulation details are presented for a jet flow model consisting of a fixed point source on the jet center line in the potential core. Author

N75-30868# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
NOISE LEVEL MEASUREMENTS AND OCTAVE SPECTRUM INSIDE WORKING PLACE, AIMING THE DETECTION OF NOISE POLLUTION
L. X. Nepomuceno 19 May 1975 8 p In PORTUGUESE; ENGLISH summary
(Rept-7505.788) Avail: NTIS HC $3.25

The results of ambient noise measurements in the Mirabel factory are presented. It is concluded that no harmful levels of noise exist in the factory, as the noise levels are below 90 db. F.O.S.

N75-30869# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
SOUND LEVEL MEASUREMENT AND ANALYSIS IN INDUSTRIAL INSTALLATIONS AND IN COMPLAINING NEIGHBORS. LEGAL SITUATION
L. X. Nepomuceno 17 Apr. 1975 21 p In PORTUGUESE; ENGLISH summary
(TR-7504.780) Avail: NTIS HC $3.25

A schematic is presented of the observed spots, where the measurement and analysis were made. The results are presented in charts and third-octave spectra for each spot. The conclusions are based on the noise limit regulations imposed for the city of Sao Paulo. Author

N75-30870# Naval Ship Research and Development Center, Bethesda, Md.
THEORETICAL AND EXPERIMENTAL METHODS FOR DETERMINING THE FAR FIELD ACOUSTIC PRESSURE RADIATED BY ARBITRARILY EXCITED, FINITE RECTANGULAR PLATES IN A DENSE FLUID WITH APPLICATION TO TURBULENCE EXCITATION, OPTION 5
Ralph C. Leibowitz Nov. 1974 114 p refs
(SF43452702)
(AD-A006248; NSRDC-2976E) Avail: NTIS CSCL 02/11

Simple expressions are derived for the far-field mean square acoustic pressures generated by a vibrating rectangular finite plate subjected to arbitrary excitation in an infinite rigid baffle. The plate can either be simply supported or clamped-clamped; it is thin, flat, flexible, and isotropic and may be immersed in either heavy or light fluid. For the various wavenumber domains that encompass the acoustically fast surface modes and the acoustically slow edge and corner modes of a simply supported plate, the mean square acoustic pressures are expressed in terms of (1) distribution factors, (2) directivity factors, and (3) multipoles. Additionally, for these domains, the mean square acoustic pressure maxima and corresponding directivity angles are derived for each of the several plate modal configurations, namely, the even-even, even-odd, odd-even, and odd-odd plate modes. GRA

N75-30871# Naval Research Lab., Washington, D.C.
HORIZONTAL-GRADIENT ACOUSTICAL RAY-TRACE PROGRAM TRIMAIN
B. G. Roberts, Jr. 16 Dec. 1974 136 p
(NR Proj. S01-36)
(AD-A006254; NRL-7827) Avail: NTIS CSCL 20/1

Interest has arisen in the last few years to develop analytical models of the undersea acoustic environment which are suitable for use on digital computers. To realistically represent the sound-field structure which exists in the ocean, one must consider the variation of sound speed in two dimensions: depth and range. A computer program, TRIMAIN, was written in FORTRAN 4 in which the sound-speed field for a given region is divided into triangular segments of the range-and-depth plane. Four types of intensity calculations are available: a completely random phase summation, a completely coherent phase summation, a statistical influence over depth, and an average over a convergence zone. Additional output options are ray depth distributions, ray printplots, and Calcomp ray plots, including plots of input sound speeds and of bathymetric profiles. GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-30872 British Library Lending Div., Boston Spa (England).
EMISSION TIMES AND ENERGY SPECTRA OF DELAYED NEUTRONS PRODUCED BY SPONTANEOUS FISSION OF 252Cf
V. N. Nefedov Feb. 1975 8 p refs Transl. into ENGLISH from Neitronnaya Fiz. (Obninsk), v. 4, 1974 p 155-162
(BLL-RTS-9650) Avail: British Library Lending Div., Boston Spa, Engl.: £1.40; 2 BLL photocopy coupons

A method is described for measuring the energies, emission times, and yields of delayed neutrons. For the two delayed neutron groups the following results were obtained: energy 100 + or - 40 keV and 220 + or - 40 keV, emission time T1/2 = 123 nsec and T1/2 = 27.2 nsec, yield 0.4 + or - 0.2% and 0.25 + or - 0.15% respectively. Author

N75-30873*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MICROWAVE SPECTRA OF SOME CHLORINE AND FLUORINE COMPOUNDS
William F. White Washington Aug. 1975 102 p refs
(NASA-TN-D-8002; L-10208) Avail: NTIS HC $5.25 CSCL 07D

A computer-controlled microwave spectrometer was used to catalog reference spectra for chemical analysis. Tables of absorption frequencies, peak absorption intensities, and integrated intensities are shown for 21 organic compounds which contain chlorine, fluorine, or both. Author

N75-30874*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MICROWAVE SPECTRA OF SOME VOLATILE ORGANIC COMPOUNDS
William F. White Washington Jun. 1975 143 p refs
(NASA-TN-D-7904; L-9995) Avail: NTIS HC $5.75 CSCL 07D

A computer-controlled microwave (MRR) spectrometer was used to catalog reference spectra for chemical analysis. Tables of absorption frequency, peak absorption intensity, and integrated intensity are included for 26 volatile organic compounds, all but one of which contain oxygen. Author

N75-30875# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE USE OF 200 KeV PROTONS IN SCATTERING STUDIES AND X-RAY GENERATION M.S. Thesis
Edward W. Merz Mar. 1975 76 p refs
(AD-A009211; GNE/PH/75-8) Avail: NTIS CSCL 20/8

In this report the Rutherford differential-scattering cross section is reviewed. The use of low energy protons in backscattering spectrometry is evaluated on the basis of theoretical considerations of the elastic scattering process. An expression for the determination of thin foil thickness from backscattering spectra is given. Cross sections for ionization and X-ray production for protons are discussed. Experimentally obtained cross sections (from the literature) for M-shell ionization are shown. Experimental results from scattering studies and X-ray generation by hydrogen ions with energies of 140 to 170 keV are given. An estimate

of the relative intensity of the H(+) and H2(+) ions is made on the basis of spectra obtained in scattering studies. A backscattering spectrum is used to determine thin foil thickness, and the result is compared to the known foil thickness. X-ray spectra of thorium and blood show that thorium may be detectable to the 8 ppm level and that sulphur, chlorine, and potassium can be detected in blood. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N75-30876* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PROTECTED ISOTOPE HEAT SOURCE Patent

Raymond K. Burns, Lloyd I. Shure, and Elliott D. Katzen, inventors (to NASA) Issued 12 Aug. 1975 5 p Filed 26 May 1971 Supersedes N71-35153 (9 - 21, p 3530)

(NASA-Case-LEW-11227-1; US-Patent-3,899,680; US-Patent-Appl-SN-146939; US-Patent-Class-250-496; US-Patent-Class-244-1SS; US-Patent-Class-250-493) Avail: US Patent Office CSCL 18B

A radioactive isotope capsule is disposed in a container (heat shield) which will have a single stable trim attitude when reentering the earth's atmosphere and while falling to earth. The center of gravity of the heat source is located forward of the midpoint between the front face and the rear face of the container. The capsule is insulated from the front face of the container but not from the rear surface of the container.

Official Gazette of the U.S. Patent Office

74 OPTICS

Includes light phenomena.

N75-30877+ Laboratoire de Biophysique, Paris (France).

MESOMORPHIC MATERIALS USED AS PHONON SENSITIVE SURFACES FOR REAL TIME HOLOGRAM RESTITUTION Final Report [ETUDE DES MESOMORPHES POUVANT SERVIR DE SURFACES PHONOSENSIBLES DANS LA RECONSTITUTION D'HOLOGRAMMES EN TEMPS REEL]

J. Perrin, A. Dmitrief, B. Richard, and W. Urbach Oct. 1974 50 p refs In FRENCH

(Contract DGRST-72-7-0118)

Avail: NTIS HC $3.75

The use of a liquid crystal matrix to display a real time acoustical binary phase-hologram is described. The techniques required to produce homogeneous layers of nematic crystals are discussed with regard to alignment by external fields, evaporated films, or physico-chemical means. The specific electronic circuits to excite the 10 x 10 experimental matrix are detailed. The actual fabrication of the matrix and optical properties obtained are described. ESRO

N75-30878+ Paris-Sud Univ., Orsay (France). Lab. d'Optique Coherente.

VERY HIGH LUMINOSITY HOLOGRAPHICAL SPECTROGRAPH USING FOURIER TRANSFORM Final Report [ETUDE D'UN SPECTROGRAPH PAR TRANSFORMATION DE FOURIER A TRES HAUTE LUMINOSITE BASEE SUR L'HOLOGRAPHIE]

Feb. 1973 123 p In FRENCH

(Contract DGRST-70-02-260)

Avail: NTIS HC $5.25

A holographic spectrograph with high dynamic range and luminosity is discussed. A transversal interferometer was used in incoherent illumination, the photographic plate being read after exposure to incoherent light. The amplitude in the Fourier plane of this beam is the convergent Fourier transform of the amplitude recorded on the hologram. General notions on transfer functions, adaptation of the measuring surface, apodization, photographic plate characteristics curve, and modulation transfer function are reviewed. The problem of signal to noise ratio is detailed, and the dynamic range is discussed together with chirping and spectral response. The experimental spectrograph is compared with that of Bouchareine. A prototype was made and its constructional details are specified with regard to symmetry problems, tolerances, and non paraxial aberrations. The spectrum analysis methods and associated electronics are outlined. ESRO

N75-30879# Joint Publications Research Service, Arlington, Va.

SIMPLEST OPTICAL CORRELATION ANALYZERS OF THE MODULATION TYPE

V. Z. Zverev and Ye. F. Orlov 1 Aug. 1975 36 p refs Transl. into ENGLISH from Opticheskiye Analizatory (Moscow), 1971 p 86-123, 238-240

(JPRS-65369) Avail: NTIS HC $3.75

The results of experimental research on the use of the simplest optical correlation analyzers of the modulation type are reported. Author

N75-30880# RCA Labs., Princeton, N.J.

CHANNEL WAVEGUIDE STUDY Quarterly Technical Report, 4 Nov. 1974 - 4 Feb. 1975

J. M. Hammer, W. Phillips, and C. C. Neil 31 Mar. 1975 23 p refs

(Contract N00014-75-C-0078; ARPA Order 2327)

(AD-A008581; PRRL-75-CR-17; QTR-1) Avail: NTIS CSCL 20/6

The work described in this report is intended to lead to the demonstration of an efficient, fast electro-optic modulator based on varying the coupling between strip waveguides on a common substrate. An approximate closed-form expression for the cut-off conditions and propagation characteristics of low-order modes in diffused Gaussian strip waveguides is derived. The expression is given in terms of normalized diffusion depths and strip widths and may be used to find the operating point of a LiNb TaO3 strip guide diffused from a Nb strip of known thickness and width. An experimental LiNb TaO3 directional coupler has been fabricated by diffusing two 5-micrometer-wide 800-A-thick Nb strips spaced 2 micrometers apart into a LiTaO3 substrate. Reasonably efficient coupling of TM modes between the strips was observed. GRA

N75-30881# Office of Naval Research, London (England).

LOW LIGHT AND THERMAL IMAGING SYSTEMS

Roy F. Potter 4 Apr. 1975 14 p

(AD-A009244; ONRL-C-7-75) Avail: NTIS CSCL 17/5

Infrared thermal imaging and low light level imaging systems and components were subjects for a conference sponsored by the Institution of Electrical Engineers, and held at that Institution headquarters in London, 3-5 March 1975. The keynote speaker was Prof. R. A. Smith, CBE, who has made significant contributions to the field. This report, in addition to a synopsis of Prof. Smith's talk, contains brief outlines of talks on negative electron affinity p-silicon and gallium arsenide photoemitters, proximity focused diode intensifiers, minority carriers sweepout operation of HgCdTe photodetector, linear arrays of PbSnTe photovoltic elements, a comparison of performance of S-25 channel inverter to a GaAs proximity focused channel tube and medical applications for IR thermography. An appendix contains all titles and authors of papers presented at the Conference. GRA

N75-30882# Harry Diamond Labs., Washington, D.C.

INTERVISIBILITY BEACON SYSTEM, PHASE 1 Final Progress Report

Thomas J. Gleason and Melvin E. Sword Jun. 1974 59 p refs

(DA Proj. 1M3-64308-S-075)

(AD-A009057; HDL-PR-74-1) Avail: NTIS CSCL 14/2

The report describes the design, construction and testing of a pulsed-flashlamp, intervisibility system. The work was the first stage of an intervisibility system development program that was intended to determine and demonstrate the feasibility of using pulsed flashlamps in this application. GRA

N75-30883# Harry Diamond Labs., Washington, D.C.
INTERVISIBILITY SYSTEM, PHASE 2 Final Progress Report
Thomas Gleason, Melvin E. Sword, and Richard L. Gorman Aug. 1974 25 p
(DA Proj. 1M3-64308-D-075)
(AD-A009058; HDL-PR-74-2) Avail: NTIS CSCL 14/2

The report covers modifications to the original breadboard Intervisibility System (IVB). The redesign of the IVB produced a device capable of operating against low frequency background noise caused by cloud modulation of sunlight and atmospheric boil. The method used to accomplish the operational capability was narrowing the transmitted optical pulse allowing a wider passband and insertion of a high pass filter in the receiver. The results of field testing under sponsor supervision and recommendations for future intervisibility systems are also included in this report. GRA

N75-30884# Honeywell, Inc., Bloomington, Minn. Corporate Research Center.
AN INVESTIGATION OF PLZT FOR INTEGRATED OPTICS Final Technical Report, 1 Jan. - 31 Dec. 1974
D. Chen and N. Marzwell 1 Apr. 1975 155 p refs
(Contract N00014-73-C-0359; NR Proj. 215-221)
(AD-A009102; HR-0359-1) Avail: NTIS CSCL 20/6

Lanthanum modified lead zirconate-lead titanate ceramics (PLZT) possesses many unique electrooptic and optical properties. Its utilization for integrated optic applications were investigated. Significant research results obtained from this investigation are: Graded refractive index was achieved in PLZT by polishing, by diffusion and by electrooptic techniques. Optical waveguiding was achieved in optically polished PLZT wafers; An integrated optic waveguide modulator was constructed, utilizing the electric field induced scattering effect for beam intensity modulation. The modulation efficiency was 30mW/MHz for 50% modulation index; Single crystals of PLZT films up to 500 micrometers in size were obtained and major parameters governing the epitaxial growth were identified; and Large refractive index change of PLZT ceramics from 2.5 to 1.6 were achieved by out-diffusion. GRA

N75-30885# National Bureau of Standards, Washington, D.C. D.C. Inst. for Basic Standards.
BASIC CONSIDERATIONS OF DENSITOMETER ADJUSTMENT AND CALIBRATION Interim Report
Richard . E. Swing 3 Feb. 1975 19 p Supersedes NBS-10970
(COM-75-10524/7; NBSIR-75-682-Rev; NBS-10970) Avail: NTIS HC $3.25 CSCL 20F

The adjustment and calibration of a densitometer are considered. This is accomplished through the use of physical measurement standards with a procedure appropriate for the instrument, and brings the instrument response in line with measurements traceable to NBS. The difference between primary and secondary physical measurement standards for diffuse (visual) density is discussed. A calibration table is suggested for best use of the instrument and a computer program (BASIC language) is provided that will calculate and print a table relating instrument reading to diffuse (visual) density. GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-30886+ Paris-Sud Univ., Orsay (France). Lab. de Physique des Plasmas.
HIGH PRESSURE WORKING MODE OF HOLLOW CATHODE SPARK DISCHARGES Final Report [FONCTIONNEMENT A HAUTE PRESSION DES DECHARGES D'ARC A CATHODE CREUSE]
H. Minoo and C. Popovici Jul. 1974 32 p refs In FRENCH
(Contract DGRST-69-0-1792)
Avail: NTIS HC $3.75

The behavior of high pressure cathotrons is discussed. Methods of preheating either the gas or the cathode itself are detailed together with various geometries for the hollow cathode. Three special configurations were tested, and the results are analyzed. ESRO

N75-30887*# Stanford Univ., Calif.
THEORETICAL AND EXPERIMENTAL STUDIES OF SPACE-RELATED PLASMA WAVE PROPAGATION AND RESONANCE PHENOMENA Semiannual Report, 1 Jan. - 30 Jun. 1975
F. W. Crawford Jul. 1975 36 p
(Grant NGL-05-020-176)
(NASA-CR-143335; SU-IPR-636; SAR-17) Avail: NTIS HC $3.75 CSCL 20I

A ten year summary was given of university research on the nature and characteristics of space related plasma resonance phenomena, whistler propagation in laboratory plasmas, and theoretical and experimental studies of plasma wave propagation. Data are also given on long delayed echoes, low frequency instabilities, ionospheric heating, and backscatter, and pulse propagation. A list is included of all conference papers, publications, and reports resulting from the study. E.H.W.

N75-30888# University of South Florida, Tampa. Dept. of Physics.
CONTINUATION OF RESEARCH ON NONLINEAR PLASMA PHENOMENA AND AN INVESTIGATION OF TURBULENT HEATING SCHEMES Annual Progress Report
W. D. Jones 15 Mar. 1975 27 p refs
(Contract AT(40-1)-4338)
(ORO-4338-5) Avail: NTIS HC $4.50

A turbulence-heating plasma facility and the associated diagnostics was designed and constructed. The plasma exhibits anomalous resistivity and heating is clearly present. A large-volume double-plasma multipole facility was completed. Not only can this device be effectively utilized for testing diagnostics and RF coupling schemes for the heating experiment, but also for independently studying nonlinear processes which are thought to be responsible for the plasma heating. The behavior of ion acoustic waves in double-electron-temperature plasmas was studied. The main result is that the propagation behavior of the waves is dominated by the low-temperature electron component, even when such a component represents only a small fraction of the total plasma density. Author (NSA)

N75-30889# Akademiya Nauk URSR, Kharkov.
USING PARTICLE BEAMS TO MEASURE PLASMA POTENTIAL
A. A. Kalmykov and O. A. Lavrentev Feb. 1975 23 p refs Transl. into ENGLISH from RUSSIAN report KHFTI-74-17 (USSR), 1974 24 p Sponsored by ERDA
(UCRL-Trans-10831; KhFTI-74-17) Avail: NTIS HC $4.25

A method for measuring plasma potential, the spatial distribution of plasma potential, and other parameters is considered; it makes use of beams of heavy ions and the variation in the charge composition of probe ions in the plasma. The magnitude of the plasma potential is found from the variation in charge, while the spatial distribution of potential is constructed on the basis of measurements of particle time of flight through the plasma volume. Author (NSA)

N75-30890# Argonne National Lab., Ill. Engineering and Technology Div.
EXPERIMENTAL TWO-PHASE LIQUID-METAL MAGNETOHYDRODYNAMIC GENERATOR PROGRAM Annual Report
R. Cole, J. Cutting, W. Amend, G. Fabris, and M. Petrick Jan. 1975 80 p refs
(Contract NAonr-3-75; NR Proj. 009-404)
(AD-A006100; ANL/ENG-75-02) Avail: NTIS CSCL 10/2

An extensive series of experiments were performed in which the measured efficiency of two-phase liquid-metal MHD generators has been significantly increased by reducing dissipative boundary-layer current shunts. A series of experiments were performed in which a thin layer (0.0305 cm) of nitrogen was injected along the insulated walls of a constant-moving, conducting, liquid boundary layer. Preliminary water-nitrogen experiments were performed to study the effects of injector port geometry on

boundary-layer control. Results of the experiments indicate that the liquid boundary-layer can be effectively displaced from the wall by the injection of nitrogen parallel to the insulator wall.
GRA

N75-30891# RAND Corp., Santa Monica, Calif.
HIGH-CURRENT BEAMS. PART 1: THE WESTERN USSR RESEARCH GROUPS Interim Report
Simon Kassel and C. D. Hendricks Apr. 1975 123 p refs
(Contract DAHC15-73-C-0181; ARPA Order 189-1)
(AD-A009326; R-1552-ARPA-Pt-1) Avail: NTIS CSCL 20/7
This report was prepared in the course of a continuing study of Soviet research and development of high-current, high-energy, charged-particle (primarily electron) beams and their applications.
GRA

N75-30088 Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
THE GRAPHICAL TREATMENT OF MAGNETOHYDRODYNAMIC SHOCK WAVES IN FLOWS WITH ARBITRARILY ORIENTED MAGNETIC FIELD
Manfred Natter *In* DGLR Contrib. to Fluid Mech. and Flight Mech. 25 Jul. 1974 30 p refs In GERMAN; ENGLISH summary (For availability see N75-30082 21-01)

76 SOLID-STATE PHYSICS

Includes superconductivity.
For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N75-30892 British Library Lending Div., Boston Spa (England).
INVESTIGATION OF EXO-ELECTRONIC EMISSION IN THE OPERATION OF CONTACTS MADE FROM NOBLE METALS AND ALLOYS
R. I. Mints Feb. 1973 8 p refs Transl. into ENGLISH from Fiz. i Khim. Obrabotki Materialov (USSR), v. 4, 1973 p 118-123
(BLL-RTS-9676) Avail: British Library Lending Div., Boston Spa, Engl.: £1.60; 3 BLL photocopy coupons
The nature of exo-emission in the interaction of noble metals and alloys in precision contacts was studied. It is shown that certain regularities are observed in the variation of exo-emission intensity, due to structural changes both in the metal surfaces and in films formed in the friction zone. The relation found between the type of exo-emission originating in the friction zone and the effectiveness of contact between the materials enables an optimum combination of materials for sliding precision contacts to be selected.
Author

N75-30893 British Library Lending Div., Boston Spa (England).
EFFECT OF MECHANISMS OF PLASTIC DEFORMATION ON ACOUSTIC AND EXO-ELECTRONIC EMISSION
R. I. Mints Feb. 1975 4 p refs Transl. into ENGLISH from Metallofizika (Kiev), v. 44, 1973 p 93-96
(BLL-RTS-9680) Avail: British Library Lending Div., Boston Spa, Engl.: £0.80; 1 BLL photocopy coupon
Acoustic and exo-electric emissions were studied which arise from the formation of two-dimensional defects of twinning-on-boundary type and packing defects as a result of extension. Measurement of exo-electronic emission was effected with simultaneous recording of changes in electron work function. The experiment was conducted in a vacuum 0.000005 torr with a secondary-electron multiplier as detector for exo-electrons. The acoustic emissions were recorded with a barium titanate counter.
Author

N75-30894+ British Library Lending Div., Boston Spa (England).
DEFECT PRODUCTION BY IRRADIATION IN SEMICONDUCTORS
J. C. Bourgoin 4 Feb. 1975 29 p refs Transl. into ENGLISH from J. Phys. (Paris), Colloq. C5, Suppl. 11-12, v. 34, Nov. - Dec. 1973 p c5/49-c5/60
(BLL-PO-3178-(9022.81)) Avail: NTIS Avail: British Library Lending Div., Boston Spa, Engl.: 3 BLL photocopy coupons
The different stages governing defect production are described. Emphasis is placed on unresolved problems, such as the determination of the threshold energy for displacement, the mobility of the insterstitials at low temperature, and the nature of the damage in highly disordered regions. Electronic mechanisms which could induce or enhance the mobility of interstitial or vacancy-type defects are proposed and discussed.
Author

N75-30895+ Universite des Sciences et Techniques de Lille (France). Centre de Recherches Hyperfrequences et Semiconducteurs.
AVALANCHE DIODE FREQUENCY MULTIPLICATION. COMPARISON OF Si AND GaAs POSSIBILITIES. IMPROVEMENT OF PERFORMANCE IN THE 26-40 GHz RANGE AND EXTENSION IN THE 60-90 GHz RANGE Final Report [MULTIPLICATION DE FREQUENCE A DIODE AVALANCHE. COMPARAISON DES POSSIBILITES DU Si ET DU GaAs. AMELIORATION DES PERFORMANCES DANS LA BANDE DES 20-40 GHz ET EXTENSION DANS LA BANDE DES 60-90 GHz]
E. Constant, G. Salmer, P. A. Rolland, and A. Derycke Aug. 1974 35 p refs In FRENCH
(Contract DGRST-72-7-0513)
Avail: NTIS HC $3.75
Performance tests on new silicon and Ga-As avalanche diode frequency multipliers for Q and E bands are reported. A systematic comparison of Si versus Ga-As was performed both for multiplication by 10 and higher than 20. New diodes were prepared for which the required technological steps and actual procedures are detailed. The experimental results are compared to performances of IMPATT oscillators. As far as output power results are comparable to those obtained elsewhere, it is shown that a significant improvement is obtained in frequency stability, signal to noise ratio, and the possibility of electronic modulation.
ESRO

N75-30896+ Paris Univ. (France). Lab. de Physique des Solides.
A THERMAL DIFFUSION OF INTERSTITIAL IMPURITIES IN DIAMOND-TYPE LATTICES [ETUDE DE LA DIFFUSION ATHERMIQUE D'IMPURETTES INTERSTITIELLES DANS LES RESEAUX DE TYPE DIAMANT]
J. C. Bourgoin Aug. 1974 10 p refs In FRENCH; ENGLISH summary
(Contract DGRST-73-7-1650)
Avail: NTIS HC $3.25
Gold diffusion in silicon using capacitance voltage measurement on Schottky diodes was studied. The diffusion coefficient of gold in the temperature range from 100 to 500 C showed that gold diffuses according to the interstitial controlled dissociative mechanisms. The diffusion of gold at room temperature or at 150 K caused by X-ray or electron irradiation was also considered. The diffusion by carrier injection was observed to be in quantitative agreement with proposed models for ionization enhanced diffusion. Diode degradation is thus possible due to diffusion of deep impurities in the junction through an ionization enhanced diffusion mechanism caused by the injection.
ESRO

N75-30897+ Paris Univ. (France). Lab. de Physique des Solides.
CHARACTERIZATION BY NUCLEAR MICROANALYSIS: IMPROVEMENT OF THE SENSITIVITY AND CORRELATION WITH ION PROBE TECHNIQUE Final Report [CARACTERISATION PAR MICROANALYSE NUCLEAIRE. AMELIORATION DE LA SENSIBILITE ET CORRELATION AVEC LA TECHNIQUE DE SONDE IONIQUE]
G. Amsel [1974] 26 p refs In FRENCH
(Contract DGRST-72-7-0016)
Avail: NTIS HC $3.75
The technique of nuclear microanalysis by heavy ion backscattering was developed which makes possible a considerable improvement of the sensitivity to heavy impurities in a light semiconductor matrix. The problems of radiation detector degradation are discussed leading to improvement techniques using thin absorbers suitably chosen. A correlation with the ion probe allowed calibrating and measurements of reproductibility.
ESRO

N75-30898*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GROWTH OF DEACTIVATED LAYERS ON CsI(Na) SCINTILLATING CRYSTALS
Nancy B. Goodman Aug. 1975 23 p refs Submitted for publication Original contains color illustrations
(NASA-TM-X-70956; X-682-75-201) Avail: NTIS HC $3.25 CSCL 20B

An effective and sensitive measurement of the depth of a deactivated or dead layer can be obtained from the relative attenuation of the 22.162 KeV and 87.9 KeV X-rays emitted by Cd 109. The alpha-particles emitted by Am 241 are also useful in measuring dead layers less than 25 microns. The properties and temporal development of dead layers are discussed in detail. The rate of growth of a deal layer is closely related to the ambient humidity, and the damage to the crystal is irreversible by any known process. The dead layer can be minimized by polishing all crystal surfaces and by keeping the crystal in a vacuum or a dry atmosphere. Since a dead layer seriously inhibits the response of a crystal to X-rays of energies below approximately 20 keV, CsI(Na) detectors should not be used at these energies unless precautions are taken to ensure that no dead layer forms. Author

N75-30899# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
LUMINESCENCE AND HALL EFFECT OF ION IMPLANTED LAYERS IN ZnO Ph.D. Thesis
Bruce J. Pierce Sep. 1974 189 p refs
(AF Proj. 7367)
(AD-A005899; DS/PH/74-01) Avail: NTIS CSCL 20/12

An experimental investigation was conducted on implanted layers of Li, Na, N, P, and Ne in ZnO substrates. The primary experimental method used was cathodoluminescence, and it was found that it was possible to probe an implanted layer by varying the beam voltage of the exciting electrons. The electrical properties of the implanted layers were obtained using the van der Pauw technique, and a photoluminescence system incorporating a Nitrogen laser was used to perform time-resolved spectroscopy. Optical evidence of a shallow acceptor center in ZnO was revealed for the first time in the cathodoluminescent spectra obtained from implanted samples of ZnO; however, no evidence of type conversion and pn-junction formation was found in the electrical measurements. GRA

N75-30900# Northwestern Univ., Evanston, Ill. Materials Research Center.
BASIC AND APPLIED RESEARCH IN MATERIALS Annual Technical Report, 1 Jun. - 30 Nov. 1974
J. Bruce Wagner 30 Nov. 1974 26 p
(Grant DAHC15-73-G19; ARPA Order 2379)
(AD-A008812) Avail: NTIS CSCL 20/12

This report covers research carried out in three major areas: (1) Materials for Energy Storage, (2) Hetergeneous Catalysis and (3) Maximization of Electret Effect in Polyacrylonitrile Films. GRA

N75-30901# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
THEORETICAL RESEARCH IN THE ELECTRON AND PHONON PROPERTIES IN CRYSTALS Final Report, 1 Sep. 1969 - 30 Jun. 1974
Thomas C. Collins Feb 1975 38 p refs
(AF Proj. 7885)
(AD-A008736; ARL-75-0020) Avail: NTIS CSCL 20/12

The ground state properties of the crystal can be computer simulated by the Hartree-Fock model. Some are good even when the local density approximation to the exchange term is used. These properties include total energy, the virial coefficient, the equilibrium lattice constants, bulk modulus, X-ray form factors and Compton profiles. In order to correct the Koopman values for the excitation, one had to develop theories and computer programs well beyond the Hartree-Fock model. This has been done, and now the computer simulation of the excitations are in near agreement with experiment. One is now ready to take the next step and start computer simulating the type of devices which are used in electronic systems. GRA

N75-30902# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
REACTION OF SEMICONDUCTORS TO ION IMPLANTATION AND ELECTRON BOMBARDMENT Final Report, 1 Jul. 1964 - 30 Jun. 1974
Yoon Soo Park Feb. 1975 54 p
(AF Proj. 7885)
(AD-A008737; ARL-75-0021) Avail: NTIS CSCL 20/12

Some highlights of the research program in the areas of radiation damage, ion implantation, magnetic resonance and light emitting devices are qualitatively discussed. The radiation damage program is discussed with emphasis on the basic defect studies in electron irradiated semiconductor II-VI compounds. The ion implantation program discusses numerous possibilities for the fabrication of electronic devices from semiconductor II-VI compounds. The electrical and optical properties of ion implanted ZnSe are reported, and its suitability as surface contact injection devices, p-n junctions, light emitting diodes, and switching and memory devices is discussed. The report also concerns research on the optical and electrical properties of AgGaS2. Crystals were grown and were found upon analysis to possess the chalcopyrite structure. The lattice parameters of these crystals are evaluated. GRA

N75-30903# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CALCULATION OF EXCITON ENERGY LEVELS IN GaAs AND IN P M.S. Thesis
Daniel G. Kniola Mar. 1975 60 p refs
(AD-A008656; GEP/PH/75-6) Avail: NTIS CSCL 20/12

A theoretical study of 1s, 2s, and 2p exciton energy levels in GaAs and InP was conducted using degenerate perturbation theory. Analytical expressions for the spin-orbit energy corrections for the 1s, 2s and 2p states are given. Also listed are expressions for the dependence of the 1s-state energy corrections as a function of an external magnetic field (up to 40 kiloGauss). Comparison of theory with a small number of data points indicates good correlation of theory to data up to approximately 30 kiloGauss. GRA

N75-30904# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
REDESIGN OF A SYSTEM TO DETECT HARMONIC SPIN-FLIP RAMAN SCATTERING IN CADMIUM SULFIDE M.S. Thesis
Henry M. Woodruff, Jr. Dec. 1974 58 p refs
(AD-A008664; GE/EE/74-67) Avail: NTIS CSCL 20/12

Since the development of the first laser, scientists have sought a tunable laser. Spin-flip Raman scattering is one of a number of tunable processes explored in recent years. Spin-Flip scattering is continuously tunable as the incident laser line undergoes a frequency shift that is directly proportional to the applied magnetic field. The purpose of this thesis was to detect and record harmonic Spin-Flip Raman scattering in Cadmium Sulfide. First and second Stokes and Anti-Stokes harmonics were observed. An Argon ion laser at 4880A wavelength was used to illuminate the crystal. The third harmonic Stokes line was also observed for the first time. The g-factor was calculated for the two CdS samples used. GRA

N75-30905# Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
ACOUSTIC CHARACTERISTICS OF TWINNING IN INDIUM Interim Report
Stephen L. VanDoren, Robert B. Pond, Sr., and Robert E. Green, Jr. Nov. 1974 72 p refs
(Contract F44620-71-C-0062; AF Proj. 9782)
(AD-A009163; AFOSR-75-0607TR) Avail: NTIS CSCL 11/6

Since mechanical twinning is one of the major causes of fatigue failure in metals, acoustic emission measurements were made during mechanical deformation of indium single crystals. Indium was selected since upon stress application well delineated twins develop which can be made to disappear upon stress reversal. Associated with this twinning and detwinning are high intensity acoustic emissions and therefore indium affords an excellent material with which to develop techniques. By recording the acoustic emission signals on a video tape recorder it was possible to play them back as often as desired, to observe them

in slow and stop motion, and to play any desired portion of the signal through a spectrum analyzer for frequency analysis. The experimental results show that a correspondence exists between the duration of the acoustic signal and the volume of twinned material as determined by cinematographic observation of the generation and growth of twin bands. GRA

N75-30906# Northeastern Univ., Boston, Mass.
THE INTERACTION OF RADIATION (OPTICAL ABSORPTION AND LIGHT SCATTERING) IN METALS, MAGNETIC SEMICONDUCTORS AND DISORDERED SYSTEMS Final Report, 1 Mar. 1972 - 28 Feb. 1975
Clive H. Perry, Jeffrey B. Sokoloff, and Evangelos Anastassakis Apr. 1975 39 p refs
(Contract N00014-68-A-0207-0004; NR Proj. 018-312)
(AD-A009252) Avail: NTIS CSCL 20/12

The interaction of optical radiation (including optical absorption and Raman scattering) in metallic surfaces, magnetic semiconductors, dielectrics, mixed crystals and disordered systems have been studied both experimentally and theoretically. Experimentally the achievements have stemmed from (1) the observation of Raman scattering from metallic materials and its enhancement in the vicinity of the plasma frequency particularly in magnetic semiconductors. (2) The results from various mixed crystals and disordered systems where good agreement was obtained with simple calculations based upon the REI-model. (3) Measurement of the dispersion of surface polaritons, resonance Raman scattering in semiconductors, and uniaxial stress studies. Finally the area of rotational optical activity in crystals has provided new information on these effects with temperature and pressure and the relation between piezooptical and thermo-optical properties of crystals. GRA

N75-30907# Army Materials and Mechanics Research Center, Watertown, Mass.
QUANTITATIVE DETERMINATION OF PHASE CONTENT OF SILICON NITRIDE BY X-RAY DIFFRACTION ANALYSIS Final Report
Charles P. Gazzara and Donald R. Messier Feb. 1975 19 p refs
(DA Proj. 1T1-62105-A-330)
(AD-A008986; AMMRC-TR-75-4) Avail: NTIS CSCL 20/2

Quantitative phase analysis of mixtures of polycrystalline materials is often difficult because of the number of variables that are involved in determining the relative amounts of each phase. Among the important variables are absorption coefficients, structure factors, particle size, and identification and resolution of diffraction peaks. Phases of interest that commonly occur in silicon nitride ceramics are alpha-Si3N4, beta-Si3N4, and unreacted Si. The purpose of this investigation was to establish a simple and reproducible technique for the determination of the phase content of silicon nitride. Of particular concern was the minimization of error due to preferred orientation effects. The general approach involved calculation of the relative intensities of selected diffraction peaks, correction of these to minimize preferred orientation, effects, and comparison of the theoretical results with those obtained from analysis of a standard. GRA

N75-30908# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
SEARCH FOR A ROOM TEMPERATURE SUPERCONDUCTOR
S. Goldfein Feb. 1974 32 p refs
(DA Proj. 1T1-62105-A-329)
(AD-A009004; USAMERDC-01901-19-PMMR) Avail: NTIS CSCL 20/12

A new model for a room temperature superconductor based on a sandwich or inclusion compound is discussed. It is reinforced by findings of areas of superconductivity in the sodium salts of cholic, desoxycholic, lithocholic and cholanic acids. An extrapolation of a plot of the value of transition temperature versus the average number of valence electrons/number of atoms of the steroids showed that cholesterol, present in large quantities in the brain and wall of nerve cells, should be superconductive at room temperature. Cholesterol, however, does not have the complete postulated structure required. A study of nerve cell conductivity indicated that sodium ions were being shuttled back and forth across the cell membrane at a definite pulsed rate. These, by being stationed at key positions in the cholesterol channel could satisfy the theoretical and empirical requirements for room temperature superconductivity. GRA

N75-30909# National Bureau of Standards, Washington, D.C. Cryogenics Div.
ELECTROCALORIC REFRIGERATION FOR SUPERCONDUCTORS Semiannual Technical Report, period ending 31 Dec. 1974
Ray Radebaugh, W. N. Lawless, and J. D. Siegwarth 31 Dec. 1974 19 p
(ARPA Order 2535)
(AD-A008852) Avail: NTIS CSCL 13/1

Several significant developments have occurred in the six month period since the previous Semi-Annual Technical Report. The most significant development was the discovery that SrTiO3 glass ceramics (FEL multilayer samples) showed only heating effects at 4K for both polarization and depolarization. At the same time, the pitting problem for ceramming temperatures above 1100C was partially solved. Development work on two types of heat switches was essentially completed. Several electrothermal measurements have been done on the SrTiO3 glass-ceramic samples to try to understand why they behave as they do. In addition an apparatus for measurement of DC polarization and hysteresis was completed. GRA

N75-30910# International Business Machines Corp., Hopewell Junction, N.Y.
DAMAGE PROFILES IN SILICON AND THEIR IMPACT ON DEVICE RELIABILITY
Guenter H. Schwuttke 1 Feb. 1975 62 p refs
(Contract DAHC15-72-C-0274; ARPA Order 2196)
(AD-A008850; TR-5) Avail: NTIS CSCL 20/12

This report consists of two parts. Part one describes a new approach for semiconductor batch processing and is concerned with the reduction or elimination of crystal defects due to high temperature processing. Temperature gradient measurements and X-ray topography are used to characterize silicon wafers before and after batch processing. It is shown that defects in wafers due to heat cycling are substantially reduced through closed boat processing. Part two describes an efficient measurement technique that permits measurements of generation lifetime in the range of about or - Imsec to much - .Insec. For the measurements, a metal oxide semiconductor (MOS) capacitor is biased into strong inversion and subsequently switched into deep depletion. An experimental setup prints out or displays a typical recovery time which is introduced into a computer fed by the theoretical generation model and the wafer data. GRA

N75-30911# Harry Diamond Labs., Adelphi, Md.
AN INVESTIGATION OF THE FREQUENCY LIMITATIONS OF A SURFACE WAVE VARIABLE DELAY LINE
Theodore H. Hopp Dec. 1974 18 p refs
(DA Proj. 1W2-62301-A-300)
(AD-A008967; HDL-TM-74-28) Avail: NTIS CSCL 09/1

An acoustic surface wave, variable delay line was invented at HDL. It consists of a fixed interdigital source transducer formed by metal deposited on a piezoelectric, photoconductive surface. The receiving transducer is formed by illuminating the photoconductive surface through a mask to create the image of a transducer where the signal is to be received. By making the optics movable, a variable path length and, hence, a variable delay time can be achieved. This paper derives a limit on the maximum usable frequency of such a device and proposes some modifications to the invention which will increase this upper frequency limit. The feasibility of the systems described herein have not been experimentally investigated, but they all seem to have merit. A continuously variable acoustic surface wave delay line operating at 1 GHz appears to be feasible. GRA

N75-30912# Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
COLLISIONAL ENERGY TRANSFER AND TOPICS RELATED TO THE GAS LASER MECHANISM Final Report, 1 Dec. 1972 - 31 Dec. 1974
R. Sharma and A. Javan 10 Mar. 1975 6 p refs
(Grant AF-AFOSR-2475-73; AF Proj. 9538; AF Proj. 6813)

(AD-A008953; AFOSR-75-0501TR) Avail: NTIS CSCL 07/4

Through the two year period of the grant the work done represented important steps in the theory of energy transfer during molecular collisions and the theory of collision-induced absorption. Experimental work included measurement of the rates and temperature dependencies for near-resonant transfer processes in several systems. These results were explained by the appropriate theoretical methods using long-range multipolar interactions and the distorted-wave first-order Born approximation. Collision-induced absorption coefficients in rare gas mixtures were also calculated. Eight journal publications resulted from this research. GRA

N75-30913# Pennsylvania Univ., Philadelphia. Lab for Research on the Structure of Matter.

[RESEARCH PROGRESS IN SURFACES AND INTERFACES, IV-VI SEMICONDUCTORS, AND HETEROJUNCTIONS] Semiannual Technical Report, 1 Jun. - 30 Nov. 1974

Alan J. Heeger 30 Dec. 1974 13 p

(Contract DAHC15-73-G14; ARPA Order 2380)

(AD-A004915; LRSM-75-2) Avail: NTIS CSCL 20/12

Contents: Chemical and physical properties of surfaces and interfaces; IV-VI Semiconductor films and surfaces; Heterojunctions of PbS-Si. GRA

N75-30914# Colorado Univ., Boulder. Electromagnetics Lab.

MODAL AND COUPLING CHARACTERISTICS OF INHOMOGENEOUS DIELECTRIC SLAB WAVEGUIDES. PART 2: LOSSY SLABS AND PULSE DISPERSION

Edward F. Kuester and David C. Chang Apr. 1974 84 p refs

(Grant AF-AFOSR-2417-72; AF Proj. 9768)

(AD-A008628; SR-7; AFOSR-75-0479TR-Pt-2) Avail: NTIS CSCL 20/6

The numerical method devised in Part I of this report for lossless slabs is extended for use on slightly lossy slabs and the results for both lossless and lossy slabs are used to investigate the behavior of pulses in such structures. It is found that the attenuation constant in a guide with an asymmetric structure depends quite sensitively upon the degree of asymmetry, and that it might prove feasible to adjust the attenuation through essentially non-loss related parameters of the guide. The limitations of a widely used method for analyzing single-mode time dispersion of a pulse on a waveguide are pointed out. It is concluded that single-mode dispersion in a guide structure is actually not a problem, since attenuation will almost always obliterate the signal before appreciable broadening occurs. Finally, the limitations on the use of slab-like structures due to spatial broadening effects are briefly pursued. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N75-30915# Office of Naval Research, London (England).

THE FLUIDYNE HEAT ENGINE: HOW TO BUILD ONE, HOW IT WORKS

Harold G. Elrod 31 Dec. 1974 20 p refs

(AD-A006367; ONRL-R-14-74) Avail: NTIS CSCL 10/1

Harwell investigators have invented a novel form of heat engine, the Fluidyne, which operates on the Stirling cycle. It is capable of work production without solid moving parts, and has promise for applications where durability and reliability are paramount. Details are given for the construction of a simple model to demonstrate the thermally induced pulsations which constitute the Fluidyne's motive power. Some of the theory of operation is also outlined. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N75-30916*# Washington Univ., St. Louis, Mo. Center for Development Technology.

APPLICATION OF COMMUNICATIONS SATELLITES TO EDUCATIONAL DEVELOPMENT Final Technical Report, 1 Sep. 1969 - 31 Aug. 1975

Robert P. Morgan 31 Aug. 1975 13 p refs

(Grant NGR-26-008-054)

(NASA-CR-143328) Avail: NTIS HC $3.25 CSCL 05I

A summary of research is presented. The broad objectives of this interdisciplinary research effort were: (1) to assess the role of satellite communications as a means of improving education in the United States, as well as in less-developed areas of the world; (2) to generate basic knowledge which will aid in making rational decisions about satellite application in the field of education in the years ahead; (3) to devise systems and strategies for improving education; and (4) to educate individuals who will be knowledgeable about aspects of satellite communications policy which transcend any single discipline. Author

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-30917*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

AN OPTIMUM ORGANIZATIONAL STRUCTURE FOR A LARGE EARTH-ORBITING MULTIDISCIPLINARY SPACE BASE Ph.D. Thesis - Fla. State Univ., 1973

James M. Ragusa Washington Jun. 1975 304 p refs

(NASA-TM-X-3233) Avail: NTIS HC $9.25 CSCL 05A

An optimum hypothetical organizational structure was studied for a large earth-orbiting, multidisciplinary research and applications space base manned by a crew of technologists. Because such a facility does not presently exist, in situ empirical testing was not possible. Study activity was, therefore, concerned with the identification of a desired organizational structural model rather than with the empirical testing of the model. The essential finding of this research was that a four-level project type total matrix model will optimize the efficiency and effectiveness of space base technologists. Author

N75-30918*# Aerospace Corp., El Segundo, Calif. Advanced Orbital Systems Div.

SYSTEM COST PERFORMANCE ANALYSIS (STUDY 2.3). VOLUME 1: EXECUTIVE SUMMARY Final Report

B. H. Campbell 27 Sep. 1974 34 p refs

(Contract NASw-2575)

(NASA-CR-143367; ATR-74(7343)-Vol-1) Avail: NTIS HC $3.75 CSCL 05A

A study is described which was initiated to identify and quantify the interrelationships between and within the performance, safety, cost, and schedule parameters for unmanned, automated payload programs. The result of the investigation was a systems cost/performance model which was implemented as a digital computer program and could be used to perform initial program planning, cost/performance tradeoffs, and sensitivity analyses for mission model and advanced payload studies. Program objectives and results are described briefly. Author

N75-30919*# Aerospace Corp., El Segundo, Calif. Advanced Orbital Systems Div.

SYSTEMS COST/PERFORMANCE ANALYSIS (STUDY 2.3). VOLUME 2: SYSTEMS COST/PERFORMANCE MODEL Final Report

B. H. Campbell 27 Sep. 1974 523 p refs

(Contract NASw-2575)

(NASA-CR-143368; ATR-74(7343)-1-Vol-2) Avail: NTIS HC $12.25 CSCL 05A

A methodology which was developed for balanced designing

of spacecraft subsystems and interrelates cost, performance, safety, and schedule considerations was refined. The methodology consists of a two-step process: the first step is one of selecting all hardware designs which satisfy the given performance and safety requirements, the second step is one of estimating the cost and schedule required to design, build, and operate each spacecraft design. Using this methodology to develop a systems cost/performance model allows the user of such a model to establish specific designs and the related costs and schedule. The user is able to determine the sensitivity of design, costs, and schedules to changes in requirements. The resulting systems cost performance model is described and implemented as a digital computer program. Author

N75-30920*# Aerospace Corp., El Segundo, Calif. Advanced Orbital Systems Div.
SYSTEMS COST/PERFORMANCE ANALYSIS (STUDY 2.3). VOLUME 2, APPENDIX A: DATA BASE Final Report
B. H. Campbell 27 Sep. 1974 383 p
(Contract NASw-2575)
(NASA-CR-143369; ATR-74(7343)-1-Vol-2-App-A) Avail: NTIS HC $10.25 CSCL 05A

Data are presented on selected payload equipments (components) which were collected for the purpose of exercising the systems cost/performance model. Although most of the data is accurate, approximations based on engineering judgment and experience are used wherever actual data was unavailable. The equipments are organized according to the following subsystems which use the specific components: stabilization and control, auxiliary propulsion, data processing, communication, and electrical power. The data sheet for each component states which subsystem utilizes the component, which configurations require the component, which equipment type the component is categorized as, and the data base identifier or code number assigned to the component. The data describing the component consist of the following four types: performance, safety, cost, and schedule. Author

N75-30921*# Aerospace Corp., El Segundo, Calif. Advanced Orbital Systems Div.
SYSTEMS COST/PERFORMANCE ANALYSIS (STUDY 2.3). VOLUME 3: PROGRAMMER'S MANUAL AND USER'S GUIDE Final Report
R. F. Janz, 27 Sep. 1974 592 p
(Contract NASw-2575)
(NASA-CR-143377; ATR-74(7343)-1-Vol-3) Avail: NTIS HC $13.25 CSCL 05A

The systems cost/performance model was implemented as a digital computer program to perform initial program planning, cost/performance tradeoffs, and sensitivity analyses. The computer is described along with the operating environment in which the program was written and checked, the program specifications such as discussions of logic and computational flow, the different subsystem models involved in the design of the spacecraft, and routines involved in the nondesign area such as costing and scheduling of the design. Preliminary results for the DSCS-II design are also included. Author

N75-30922# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
NETWORK MANAGED AIR FORCE PROJECTS: THE ACCURACY OF ESTIMATES AS A FUNCTION OF TIME M.S. Thesis
James H. Lowry, Martin F. Nahlen, and William M. Peter Jan. 1975 144 p refs
(AD-A006326; SLSR-1-75A) Avail: NTIS CSCL 05/1

Recent congressional criticism has emphasized the need for accurate predictions of cost and schedule requirements for developing Air Force weapon systems. Meanwhile, network analysis has been credited with allowing the development of complex weapon systems in the minimum time and at the minimum cost. The study is focused on the relationships between the accuracy of activity-time estimates and three factors--the estimate's distance from the activity start date, activity duration, and the estimate's distance from the project start date. Multiple regression was used to estimate the relationships among the variables. Methods of improving estimating accuracy in network-managed projects are recommended. GRA

N75-30923# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
CRITERIA FOR EVALUATING CONTRACTOR MANAGEMENT POTENTIAL DURING THE SOURCE SELECTION PROCESS FOR THE ACQUISITION OF MAJOR WEAPON SYSTEMS M.S. Thesis
Timothy P. Cormany and John P. Donnellan Jan. 1975 111 p refs
(AD-A006329; SLSR-2-75A) Avail: NTIS CSCL 05/1

The purpose of the study was to analyze the proposition that a relationship exists between the managerial capabilities of the civilian contractor and the success of the contract. The proposition was developed which considered that a relationship exists between project success and the project management teams. Non-parametric statistics were used to test the hypotheses utilizing the management data gathered, and subjective analysis was applied to determine each contract's degree of success. GRA

N75-30924# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN INVESTIGATION OF NEGATIVE PRE-AWARD SURVEYS AS AN INDICATOR OF A CONTRACTOR'S INABILITY TO MEET A DELIVERY SCHEDULE M.S. Thesis
Jack A. Barnaby and Kenneth J. Bohannon Jan. 1975 102 p refs
(AD-A006330; SLSR-3-75A) Avail: NTIS CSCL 05/1

The Defense Contract Administration Services (DCAS) has established procedures for evaluating potential contractor capability; this evaluation is called the Pre-Award Survey. One of the primary concerns of the survey involves the ability of the contractor to deliver a quality product within the established parameters of the delivery schedule. The purpose of the study was to investigate whether the pre-award survey is an effective indicator of contractor performance. The study explored the delinquency rates of contracts which had both negative and positive pre-award survey recommendations. GRA

N75-30925# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN EVALUATION OF THE INTEGRATED MANAGERIAL PROGRAMMING ANALYSIS AND CONTROL TECHNIQUE SYSTEM OF THE AERONAUTICAL SYSTEMS DIVISION (AFSC), A MANAGEMENT INFORMATION SYSTEM M.S. Thesis
Wayne R. Boles and Allan L. Bowman Jan. 1975 95 p refs
(AD-A006334; SLSR-6-75A) Avail: NTIS CSCL 05/2

The Integrated Managerial Programming Analysis and Control Technique (IMPACT) System is a management information system for the management of Government Furnished Aerospace Equipment (GFAE). Interviews with the IMPACT System designers indicated that the system was not being used by GFAE managers as intended. Interviews with IMPACT System users indicated that the system did not provide the degree of flexibility and information needed for management decisions. This study determines the design objectives and the achievements of the IMPACT System. As a tool for evaluation of the system, seven standards were developed from a thorough review of management information system literature. The IMPACT System was evaluated by comparing the design objectives and the achievements to the standards. GRA

N75-30926# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE ACCURACY OF INITIAL ESTIMATING EFFORTS IN NETWORK MANAGED AIR FORCE PROJECTS M.S. Thesis
Paul E. Tyler and John F. West, III Jan. 1975 89 p refs
(AD-A006333; SLSR-4-75A) Avail: NTIS CSCL 05/1

Project managers often use network methods to divide a project into basic activities, estimate the time required for each activity, and then construct a network to show the interrelated sequencing of the activities. The initial estimated activity times provided the basis for financial planning, resource requirements determinations, and the scheduling of resources. The accuracy of the initial estimates is critical to achieving targeted project objectives since these estimates frequently determine resources authorized and committed to the project. Because of the

importance of the initial estimates, further research was required to determine how accurate the initial estimates are. This research effort demonstrated that there is a difference between the initial estimates and the actual activity time in Air Force network-managed projects which resulted in optimistic estimates. GRA

N75-30927# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE AUTHORITY RELATIONSHIPS OF CONTRACTING OFFICERS IN A PROJECT/PROGRAM MANAGEMENT ENVIRONMENT M.S. Thesis
John R. Block and Gordon E. Hadlow Jan. 1975 100 p refs (AD-A006338; SLSR-10-75A) Avail: NTIS CSCL 05/1

The objective was to explore the authority relationship of the Air Force procurement contracting officer in the setting of a program management environment. The contracting officer's position was measured as a contrast between his relationship with the program manager and his relationship with the Directorate of Procurement and Production. These relationships of the contracting officer were explored in the program management environments in the system program offices (SPO) of the Aeronautical Systems Division at Wright-Patterson AFB, Ohio. The thesis includes a discussion of the interrelationships of authority, power, and influence. GRA

N75-30928# Naval Postgraduate School, Monterey, Calif.
MANPOWER PLANNING MODELS. 1: BASIC CONCEPTS
R. C. Grinold and K. T. Marshall Dec. 1974 29 p refs (AD-A005871; NPS-55MT74122) Avail: NTIS CSCL 05/9

The report is the first in a series which present methods used in analyzing manpower planning problems. The concepts of stocks, flows, manpower classification and timing convention are introduced, together with basic flow conservation concepts and equilibrium analysis. GRA

N75-30929# Army Materiel Command, Texarkana, Tex. Intern Training Center.
AVAILABILITY PARAMETERS ALLOCATION WHEN THE REPAIR TIMES ARE A FUNCTION OF THE EXPERIENCE FACTOR Final Report
Arthur W. Paarmann Apr. 1975 51 p
(AD-A009199; USAMC-ITC-02-08-75-107) Avail: NTIS CSCL 15/5

This report makes the assumption that the times to repair the components of a system behave as predicted by experience curve theory, and it describes a method for allocating the availability parameters (repair times, and failure rates) to the various components that make up a system. The allocating procedure is handled as an availability maximization problem, subject to the constraint that the number of component failures are equal to the number of system failures. A Lagrange multiplier technique is employed to obtain the solution. GRA

N75-30930# Army Materiel Command, Texarkana, Tex. Intern Training Center.
MANAGING COST OVERRUN ENGINEERING CHANGE PROPOSALS Final Report
William F. Mariutto Apr. 1975 39 p refs
(AD-A009183; USAMC-ITC-02-08-74-211) Avail: NTIS CSCL 05/1

This research report examines data collected representing cost estimates for engineering changes and the actual cost of the change. It gives a picture of the outcome of the present method of approval authority at the United States Army Electronics Command. The history of past cost estimates is reviewed and by use of regression analysis an attempt is made to control possible cost overruns in the future. This data revealed a serious deficiency in certain areas and a recommendation is made to revise the present method to try to reduce the serious cost overruns that occurred. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N75-30931*# Washington Univ., St. Louis, Mo. Center for Development Technology.
CONTINUING PROFESSIONAL EDUCATION: STATUS, TRENDS, AND ISSUES RELATED TO ELECTRONIC DELIVERY
Donna Rothenberg Aug. 1975 74 p refs
(Grants NGR-26-008-054; NSF EC-38841)
(NASA-CR-143329; CG-75/5) Avail: NTIS HC $4.25 CSCL 05B

Four professional groups, teachers, doctors, lawyers, and engineers were examined to determine if they constitute a potential market for continuing professional education via large scale electronic technology. Data were collected in view of social and economic forces, such as mandatory periodic relicensure, additional course requirements for certification, or the economic health of supporting industries. Author

N75-30932*# Southwest Research Inst., San Antonio, Tex. Dept. of Bioengineering.
PREPARATION OF AN INFORMATION BROCHURE AND EXHIBIT OF NASA TECHNOLOGY APPLICATIONS Final Report
Robert L. Wilbur Aug. 1975 9 p
(Contract NAS9-14225; SwRI Proj. 13-4000)
(NASA-CR-144393) Avail: NTIS HC $3.25 CSCL 05B

A biomedical applications display cased is described along with its requirements. The preparation of a brochure on NASA contributions to biomedicine is also discussed briefly. M.J.S.

N75-30933# Royal Aircraft Establishment, Farnborough (England).
CONDITIONS AND RESTRICTIONS ON THE FORMULATION OF A HUMAN BIOMETRIC DATA BANK
May 1975 12 p Transl. into ENGLISH from Anthropologie Appl. (Paris), Document AA-69/74, 1974
(RAE-Lib-Trans-1833; BR48101; AA-69/74) Avail: NTIS HC $3.25

The formation and use of a proposed bank of human biometric data is discussed along with the manner in which data of various types would be presented. Computer programs for the data bank are also included. M.J.S.

N75-30934*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
USERS GUIDE FOR INFORMATION RETRIEVAL USING APL
Arthur Shapiro Aug. 1974 19 p
(NASA-TM-X-72578; NSSDC-74-11) Avail: NTIS HC $3.25 CSCL 05B

A computer program called IRA (information retrieval using APL) is described. This program accesses a data base containing information relating to space science experiments and to the phenomena being measured. IRA is a tool for retrieving information in response to requests made by the scientific community. IRA is executed from a remote terminal (to the IBM 360/95) and results are achieved in seconds. The data base, the general search requirement, and the system's operation characteristics are described. Author

N75-30935*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONFIGURATION DESCRIPTION AND LOAD ANALYSIS FOR THE ATMOSPHERIC AND OCEANOGRAPHIC INFORMATION PROCESSING SYSTEM (AOIPS)
John T. Dalton Jul. 1975 41 p
(NASA-TM-X-70960; X-933-75-217) Avail: NTIS HC $3.75 CSCL 05B

A computer system for processing image data is described. It essentially consists of two minicomputer systems. System

components are listed and discussed, and flow charts are shown. J.R.T.

N75-30936# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
FLEXIBILITY IN INFORMATION RETRIEVAL FOR THE BASE LEVEL MANAGER M.S. Thesis
Joseph A. Coleman and Harris Keller Jan. 1975 114 p refs
(AD-A006337; SLSR-9-75A) Avail: NTIS CSCL 05/2

Standard (preprogrammed) automated data systems are inflexible in satisfying all of the information needs of base level managers. This inflexibility could be alleviated by the use of information retrieval systems, which are designed to extract specific information from a data base, and output that information in the format specified by the user. There are four retrieval systems currently in use at base level within the Air Force. The diversity in the characteristics of these four systems causes confusion on the part of base level managers. This thesis developed eight characteristics which should be included in each base level retrieval system. These eight characteristics were then compared to each of the four base level retrieval systems to determine the extent that each of the retrieval systems possessed the proposed characteristics. The extent that each of the four retrieval systems possessed the eight characteristics was viewed as the degree of flexibility in information retrieval afforded by a particular retrieval system. GRA

N75-30937# Analysis and Computer Systems, Inc., Burlington, Mass.
ANALYSIS AND SIMULATION BRANCH (SUYA) PROJECT/PROBLEM LIBRARY Final Report, 7 Mar. 1971 - 30 Jun. 1974
Donald J. Armstrong and Joanne Doughty Jun. 1974 46 p
(Contract F19628-71-C-0138)
(AD-A006132; AFCRL-TR-74-0350) Avail: NTIS CSCL 05/2

The report describes techniques developed to optimize storage and information retrieval phases of the Project/Problem Library utilizing CDC 6600 computer resources. GRA

N75-30938# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
UNDERSTANDING DATA STRUCTURES Ph.D. Thesis
Rob Gerritsen Feb. 1975 232 p refs
(ARPA Order 2466)
(AD-A008937; AFOSR-75-0545TR) Avail: NTIS CSCL 09/2

Data management programmers are finding their jobs are getting tougher because of the gradual replacement of sequential data bases by network data bases. In addition, there is a new job called Data Administrator for handling the data structure problems associated with network data bases. The goal of this thesis is reduction of these data management tasks by developing and applying a practical theory of data structure. To insure the practical flavor of this research, the Data Base Task Group (DBIG) report has been selected as the specification of the data management system in which the applications function. GRA

N75-30939# CNR, Inc., Newton Upper Falls, Mass.
CODING/MUX OVERHEAD STUDY Final Technical Report, Apr. 1973 - May 1974
D. Chase, P. A. Bello, L. J. Weng, A. Joffe, and K. Wilmer Mar. 1975 472 p
(Contract F30602-73-C-0271; AF Proj. 4519)
(AD-A009174; RADC-TR-75-71) Avail: NTIS CSCL 09/4

This report describes the results of an investigation of the combined design of an asynchronous-to-synchronous multiplexer and error correction coding techniques for megabit data transmission over a troposcatter channel. In addition to the conventional interleaved coding approach, adaptive feed forward coding techniques, such as multiple rate and block interleaved product codes, were studied. GRA

N75-30940# Informatics, Inc., Rockville, Md.
SOVRaD: A DIGEST OF RECENT SOVIET R AND D ARTICLES. VOLUME 1: NUMBER 3, 1975
S. Hibben, L. Boylan, J. Kourilo, B. Shresta, and M. Ness Mar. 1975 21 p refs
(Contract N00600-75-C-0018; DARPA Order 2790)
(AD-A009249) Avail: NTIS CSCL 05/2

This is a collection of brief abstracts on miscellaneous topics from the current Soviet technical literature. The intent is to supply a quick look at items of possible interest, including topics not necessarily named in the DARPA interest profile, as a supplement to the reportage on specified topics. GRA

N75-30941# Mitre Corp., Bedford, Mass.
AIR FORCE VEHICLE INTEGRATED MANAGEMENT SYSTEM (VIMS) DATA HANDLING STUDY
N. B. Sutherland Feb. 1975 67 p refs
(Contract F19628-73-C-0001; AF Proj. 572P)
(AD-A009147; MTR-2875; ESD-TR-75-1) Avail: NTIS CSCL 15/5

The Vehicle Integrated Management System (VIMS) is a base level management system that processes data related to vehicle maintenance. Vehicle maintenance data is collected and processed daily on the B3500 computer. This paper reports on a brief study and evaluation of VIMS that explored possible alternative techniques for improving the handling of vehicle maintenance management data. VIMS strengths and weaknesses are discussed, several near term improvements are suggested, and pursuit of a restructuring of VIMS to operate on-line is recommended. GRA

N75-30942# System Development Corp., Santa Monica, Calif.
USER'S GUIDE TO THE SOLAR THEORETICAL BACKGROUNDS FILE
Timothy C. Diller 21 Apr. 1975 22 p
(Contract DAHC15-73-C-0080; ARPA Order 2254)
(AD-A009329; SDC-TM-5292/002/00) Avail: NTIS CSCL 05/7

The document contains a general explanation of the theoretical backgrounds file of SOLAR (a Semantically-Oriented Lexical Archive). It is intended as an introduction and reference manual for the on-line user, the casual reader, or the data collector. The document indicates the design concepts, the resulting file structure, the intended file content, retrieval procedures, and data collection procedures. GRA

N75-30943# New England Board of Higher Education, Wellesley, Mass.
NORTHEAST ACADEMIC SCIENCE INFORMATION CENTER (NASIC) YEAR 2 REPORT Annual Report, Mar. 1974 - Feb. 1975
David M. Wax Apr. 1975 177 p refs
(Grant NSF SIS-73-08366)
(PB-241312/8; NASIC-NSF-74-75-1) Avail: NTIS HC $7.00 CSCL 05B

Working through the libraries at institutions, NASIC concentrates its efforts in four areas: (1) training of library staff members to become effective intermediaries between user information needs and the two major on-line bibliographic systems, (2) consulting with library administrators on the administrative decisions required to implement local on-line search services, (3) cooperating with library staff in a program of user education related to the merits of machine-readable bibliographic services, and (4) serving as a spokesman for the academic community in dealing with data base producers and search service vendors. Of substantial importance was the effort devoted to the development of training material related to both search systems and data bases. GRA

N75-30944# Minnesota Univ., Minneapolis. Dept. of Management Sciences.
A REGIONAL ENERGY INFORMATION SYSTEM FOR MINNESOTA: A PRELIMINARY DESIGN
Norman L. Chervany, J. David Naumann, Ralph Krishnan, Daniel Quillin, and John Schmitt Jan. 1975 135 p Sponsored by Minnesota Energy Agency, St. Paul
(PB-241124/7; MEA/REIS-7502) Avail: NTIS HC $5.75 CSCL 05B

A state's (Minnesota's) energy system, with its socio-economic plans that take energy constraints into consideration, is reviewed for policy makers. Four types of data, (1) energy supply/distribution/consumption data, (2) demographic data, (3) economic data, and (4) engineering data are found to be needed to support the short run energy allocation problems and long run energy planning problems. Preliminary design of a regional energy information system in this report. The system is designed to

collect, store, and report the supply/distribution/consumption data. This data category was focused on primarily. Timely, valid data on energy supply, distribution, and consumption are technically feasible to obtain. GRA

N75-30945# Minnesota Univ., Minneapolis. Dept. of Management Sciences.
MASTER PLAN FOR REIS IMPLEMENTATION Final Report
Peter C. Knobloch Aug. 1974 52 p Sponsored by Minnesota Energy Agency, St. Paul
(PB-241126/2; MEA/REIS/WP-7408) Avail: NTIS HC $4.25 CSCL 05B

Implementation requirements of the regional energy information system (REIS) and provision of a brief cost/benefit analysis of the proposed system is discussed. Divided into four sectors (problems, requirements, the present system, and the proposed implementation of REIS), the development of a demonstration data base, its implementation and that of the regional input-output model as a tool for decision makers are subjects of the report. The accounting subsystem and energy flow network model are two main components; the need to identify specific problems, to gather information on source, energy type, location, use, time with cross classification, the structure of REIS with parameter subsystem, and a description of the study area (N.E. Minnesota) are included. GRA

N75-30946# Minnesota Univ., Minneapolis. Dept. of Management Sciences.
DESIGN CONSIDERATIONS FOR A COMPREHENSIVE REGIONAL ENERGY INFORMATION SYSTEM
J. D. Naumann, P. C. Knobloch, and N. L. Chervany 1 Jul. 1974 35 p Sponsored by Minnesota Energy Agency, St. Paul
(PB-241123/9; MEA/REIS/WP-7401) Avail: NTIS HC $3.75 CSCL 05B

The regional energy information systems (REIS) concerns itself with decision making on substate, state, and regional levels in emergencies, for tactical decisions, and long-range strategic policies by both government and industry. Effective access to energy information is critical, and REIS is designed to provide a standardized data base with design goals, constraints, parameters, and schedules. The REIS system is being developed; many states, the FEA, and other agencies are developing energy information systems. Shareability of data must be sought, and both technical and procedural requirements for this are discussed, and a plan for action is presented. GRA

N75-30947# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
NASIC AT MIT Final Report, 1 Mar. 1974 - 28 Feb. 1975
Alan R. Benenfeld, Mary E. Pensyl, Richard S. Marcus, and J. Francis Reintjes 28 Feb. 1975 104 p refs Prepared in cooperation with New England Board of Higher Education, Wellesley, Mass.
(Grant NSF GN-37296)
(PB-241311/0; ESL-FR-587) Avail: NTIS HC $5.25 CSCL 05B

Computer-based reference search services to users on a fee-for-service basis at M.I.T., continued as the first, and experimental, node in the development of the Northeast Academic Science Information Center under a New England Board of Higher Education program. Development of a training program for information specialists and training materials is described. GRA

N75-30948# National Bureau of Standards, Washington, D.C.
NATIONAL BUREAU OF STANDARDS ANNUAL REPORT: FISCAL YEAR 1974 Final Report
Dick Franzen, ed. Mar. 1975 36 p Supersedes NBS-SP-397 (COM-75-10465/3; NBS-SP-418; NBS-SP-397) Avail: NTIS MF $2.25; SOD HC as C13.10:418 CSCL 05B

The document described how resources were utilized during fiscal year 1974 and highlights major achievements. Brief discussions are included of accomplishments within major program areas. The report serves as (1) an annual account of NBS activities and (2) promotional information about NBS. The table of contents includes: standards for daily living; expanding measurement capabilities; toward solving the energy problem; improving man's environment; striving for safer products; aiding health care; advancing computer technology; public interests; government projects; industry cooperation; and information services. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N75-30949# Aerospace Corp., Los Angeles, Calif.
ECONOMICS OF AIRPORT OPERATION, CALENDAR YEAR 1972 Final Report
Joseph A. Neiss Apr. 1974 51 p refs Sponsored by FAA
(AD-A005892) Avail: NTIS CSCL 01/5

The objective of the study is to develop data and information on airport operation and ownership economics to assist in formulating policy and criteria affecting both the physical and economic capacity of airports. The study analyzes how airport operating revenues, expenses, and investment costs vary by airport size, operation, and location. Detailed traffic and financial statistics of 92 air carrier and 84 general aviation airports are presented for analytical comparison. Data are presented as both total and unit revenues and costs. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-30950# Miami Univ., Fla. Sea Grant Inst. Program.
AN ANONYMOUS DRAFT TREATY ON THE LAW OF THE SEA
Dennis M. OConnor Mar. 1975 137 p
(Grant NOAA-04-3-158-14)
(COM-75-10478/6; NOAA-75032801; Special-Bull-29) Avail: NTIS HC $5.75 CSCL 05D

A draft treaty is presented, representing the common interests of nations with regard to navigation, fisheries, coastal state seabed jurisdiction, the international seabed area, marine scientific research, and marine pollution. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N75-30951*# ABT Associates, Inc., Cambridge, Mass.
URBAN DEVELOPMENT APPLICATIONS PROJECT. URBAN TECHNOLOGY TRANSFER STUDY Final Report
1 Jan. 1975 33 p refs
(Contract NAS9-13752)
(NASA-CR-144363; AAI-75-79) Avail: NTIS HC $3.75 CSCL 05K

Technology transfer is defined along with reasons for attempting to transfer technology. Topics discussed include theoretical models, stages of the innovation model, communication process model, behavior of industrial organizations, problem identification, technology search and match, establishment of a market mechanism, applications engineering, commercialization, and management of technology transfer. M.J.S.

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-30952 Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ABSOLUTE ROCKET PHOTOMETRY OF GAMMA-ORI IN THE VUV REGION
H. Hessberg, J. Niekerke, and K.-H. Stephan Dec. 1974 42 p refs Submitted for publication
(MPI-PAE/Extraterr-105) Avail: Issuing Activity

Results from absolute photo flux measurements of GAMMA-ORI (No. 35468, B2 III) are presented. Two rocket-borne photometers were used operating in the 1250 to 3000 A band with bandwidth 100 to 200 A. Calibration was performed with black body radiation. Results with 25 percent uncertainty compared with previous measurements and model calculations. ESRO

N75-30953*# Cornell Univ., Ithaca, N.Y.
DETECTION OF THE (OIII)88.16MU LINE IN M17
Dennis B. Ward, George Gull, and Martin Harwit [1975] 9 p refs
(Grant NGR-33-010-146)
(NASA-CR-143366) Avail: NTIS HC $3.25 CSCL 03A

The detection of a predicted transition, the fine structure line of O3 at 88.16 microns in the H 2 region M17, was reported. Line intensity was measured at 2.2 sub + 7 sub -0.7 times 10 to the 15th power. Author

N75-30954*# Hale Observatories, Pasadena, Calif.
OPTICAL AND INFRARED SPECTROPHOTOMETRY OF 18 MARKARIAN GALAXIES
E. E. Becklin, G. Neugebauer, J. B. Oke, and L. Searle [1975] 47 p refs Prepared in cooperation with Calif. Inst. of Technol., Pasadena and Carnegie Inst. of Washington, Pasadena, Calif.
(Grants NGL-05-002-207; NGL-05-002-134)
(NASA-CR-143379) Avail: NTIS HC $3.75 CSCL 03A

Slit spectra, spectrophotometric scans and infrared broad band observations are presented. Eight of the program galaxies can be classified as Seyfert galaxies. Arguments are given that thermal, nonthermal and stellar radiation components were present. One group of Seyfert galaxies was characterized both by the presence of a high density region of gas and by a continuum dominated by nonthermal radiation. The continua of the remaining program Seyferts, which did not have a high density region of gas, were dominated by thermal radiation from dust and a stellar continuum. Ten of the galaxies, which are not Seyfert galaxies, are shown to be examples of extragalactic H 2 regions. Author

N75-30955*# Systems Research Lab., Champaign, Ill.
RESEARCH STUDY ON STABILIZATION AND CONTROL. MODERN SAMPLED-DATA CONTROL THEORY: STABILITY ANALYSIS OF THE LOW COST LARGE SPACE TELESCOPE SYSTEM Final Report
B. C. Kuo and G. Singh 30 Jun. 1975 129 p refs
(Contract NAS8-29853)
(NASA-CR-143933) Avail: NTIS HC $5.75 CSCL 03A

The pointing stability of the low-cost large space telescope (LST) system was investigated. The low-cost LST is characterized by the use of reaction wheels for the generation of control torques. Because of the critical requirement on the pointing accuracy of the LST, the nonlinear frictional characteristics of the bearings of the reaction wheels were studied which can cause limit cycles in a closed-loop system. Another possible source of pointing error in the LST is due to the effect of quantization and sensor noise. Since the LST is a digital system, digital to analog and analog to digital converters and sensors for positional and rate feedbacks were used. Sensor noise and amplitude quantization causes pointing error in the LST and, in addition, quantization is a nonlinear phenomenon which can cause self-sustained oscillations in the closed-loop system. The dynamic modeling of the single-axis LST is described, and several methods of evaluating the attitude error of the digital LST due to quantization and noise inputs are given. Author

N75-30956*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ASTROMETRIC BINARY Mu CAS: PHOTOGRAPHICALLY ALMOST RESOLVED, AND ITS IMPLICATIONS ON THE PRIMORDIAL HELIUM ABUNDANCE
Walter A. Feibelman Jul. 1975 17 p refs
(NASA-TM-X-70950; X-673-75-182) Avail: NTIS HC $3.25 CSCL 03A

The Population 2 sub-dwarf star mu Cas was photographed, yielding elongated images from which the separation magnitude of the unseen component can be derived. Author

N75-30957# European Space Research Organization, Paris (France).
SPACE ASTROMETRY
T. D. Nguyen, ed. and B. T. Battrick, ed. Mar. 1975 147 p refs Partly in ENGLISH and partly in FRENCH Proc. of a Symp. held at Frascati, Italy, 22-23 Oct. 1974
(ESRO-SP-108) Avail: NTIS HC $5.75

The scientific importance and astronomical applications of a spaceborne telescope and astronomical Spacelab missions are explored. For individual titles, see N75-30958 through N75-30974.

N75-30958 Strasbourg Univ. (France). Observatoire.
SPACE ASTROMETRY PROJECTS
P. Lacroute *In* ESRO Space Astrometry Mar. 1975 p 5-30 (For availability see N75-30957 21-89)

Two space astrometry projects are presented which are specially designed for obtaining a very precise, coherent and complete stellar reference system. Both projects are based on a reference angle given by a complex mirror and on the accurate photoelectric measurement of relative positions in a telescope field while stars are scanned on a grid. The first project utilizes a Spacelab borne 40 cm-diameter telescope. Precision on the parallaxes can be obtained from two years of scanning, and a scan program of 40,000 stars could be envisaged. The second project utilizes a simpler guidance device, and could be flown on board a free flyer similar to the TD-1 satellite. The automatic sky scanning will enable the positions of 300,000 stars up to magnitude 11 to be determined with random errors in positions and parallaxes. Author (ESRO)

N75-30959 Universite des Sciences et Techniques de Lille (France). Lab. d'Astronomie.
SPACE ASTROMETRY PROJECT: OPTICAL CONCEPT
P. Bacchus *In* ESRO Space Astrometry Mar. 1975 p 31-35 (For availability see N75-30957 21-89)

Solutions are proposed for a telescope Spacelab where an aplanatic system is sufficient because focals parallel to the grid can be used. In the TD option, an aplanatic system is required. It is possible to use four reflection optics (plane mirror, large concave mirror, small convex mirror, and a fourth reflection from the central part of the large mirror) or three reflection optics (deformed plane mirror, large mirror, small mirror). With four reflections, the residual aberrations are negligible. With three reflections, the residual aberrations are notable, but hardly compensatable. The scattered light seems easier to eliminate in the last case than in the former. Author (ESRO)

N75-30960 Universite des Sciences et Techniques de Lille (France). Lab. d'Astronomie.
SPACE ASTROMETRY PROJECT: REDUCTION BY MULTILATERATION
P. Bacchus *In* ESRO Space Astrometry Mar. 1975 p 37-42 (For availability see N75-30957 21-89)

For the Spacelab option, the unknowns (positions, parallaxes, proper motions, instrument constants) and the data (extent

catalogs, measured arcs) are specified and enumerated. In a simple mathematical model, the minimal number of data needed for the problem to be solvable is specified, and in the case of superabundant data the variance of the unknowns is determined. The concepts of mobility, rigidity, peeling and kernel are introduced. Numerical experiments on a star sample provide the necessary redundancy of measured arcs. For the parallax determination, observational schemes in which the arcs are measured 2 or 3 times are proposed, with their subsequent precisions.
Author (ESRO)

N75-30961 Centre National d'Etudes Spatiales, Paris (France).
FEASIBILITY OF AN ASTROMETRICAL SATELLITE. RESULTS OF A CNES STUDY [FAISABILITE D'UN SATELLITE ASTROMETRIQUE. RESULTAT D'UNE ETUDE CNES]
J. C. Husson *In* ESRO Space Astrometry Mar. 1975 p 43-47 In FRENCH (For availability see N75-30957 21-89)

An astrometrical satellite feasibility study carried out from 1969 to 1970 is presented. This study has shown that the critical area lies in the telescope optics. The critical points of the instrument are essentially the focal stability, the paraxial enlargement stability, and the realization of the complex mirror.
ESRO

N75-30962 Leander McCormick Observatory, Charlottesville, Va.
ASTROMETRIC EXPERIMENTS FOR THE LARGE SPACE TELESCOPE
L. W. Fredrick, H. D. McAlister, W. F. vanAltena (Yale Univ. Obs.), and O. G. Franz (Lowell Obs.) *In* ESRO Space Astrometry Mar. 1975 p 49-58 refs (For availability see N75-30957 21-89)

The basic astrometry problems are reviewed to which the LST will offer major contributions: parallaxes, binary stars, stellar dimensions, and fundamental coordinate system. Two novel approaches to setting up the fundamental coordinate system are discussed: a system of precision gyroscopes, and an orthogonal axis telescope. The relative accuracy of positions over the whole sky should be in the order of + or - 0.001 arc sec of arc after several measurements. The Astrometric Multiplexing Area Scanner (AMAS) is discussed as a means of obtaining parallax measurements. This instrument, in its prototype stage, is measuring relative stellar positions to + or - 2 micron (m.e.). The theoretical limit is in the submicron range.
Author (ESRO)

N75-30963 Copenhagen Observatory (Denmark).
PRESENT AND FUTURE MERIDIAN ASTROMETRY
E. Hoeg *In* ESRO Space Astrometry Mar. 1975 p 59-64 refs (For availability see N75-30957 21-89)

The role of atmospheric inhomogeneities is discussed for ground-based astrometric observatories. Modern photoelectric meridian circles will soon be able to produce observations with a mean error of 0.15 arc sec at a rate of nearly 100 observations per observing hour. If, however, the development of ground-based meridian techniques were to be intensified and an astrometrically optimal site for the instrument selected, an improvement in weight by two orders of magnitude could be envisaged. In a few years time it should be possible with a single meridian circle to collect observations which in accuracy, completeness and number by far surpass the results of all previous meridian observations.
Author (ESRO)

N75-30964 Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
POSSIBLE CONTRIBUTIONS OF SPACE ASTROMETRY TO THE DEFINITION OF AN ABSOLUTE REFERENCE SYSTEM [CONTRIBUTIONS POSSIBLES DE L'ASTROMETRIE SPATIALE A LA DEFINITION D'UN SYSTEME DE REFERENCE ABSOLU]
J. Kovalevsky *In* ESRO Space Astrometry Mar. 1975 p 67-71 In FRENCH (For availability see N75-30957 21-89)

An extension of absolute celestial reference systems was studied that includes diversity of the characteristics of reference objects and their celestial densifications. Two methods are proposed: series interferometer observations at different wavelengths and the use of an intermediate terrestrial system. It is also possible to make the astrometry system absolute by including star heaps in the observational programs. This does not exclude the necessity of making intercomparisons with other systems.
ESRO

N75-30965 Astronomische Rechen-Institut, Heidelberg (West Germany).
EXTENSION OF A STELLAR REFERENCE SYSTEM BY MEANS OF SPACECRAFT: OBSERVED FAINT STARS
H. G. Walter *In* ESRO Space Astrometry Mar. 1975 p 73-77 refs (For availability see N75-30957 21-89)

The incorporation of stellar observations acquired in space into the Fourth Fundamental Catalog (FK4) and eventually the FK5 system is discussed, such that these mainly faint stars allow extension of the system. Differential observations with 0.01 arc sec accuracy from spaceborne equipment are capable of extending the present reference system down to magnitude 10, or possible 17. Suitably selected faint stars in the vicinity of radio sources facilitate the interconnection of the optical and radio systems.
ESRO

N75-30966 Naval Observatory, Washington, D.C.
THE FUNDAMENTAL REFERENCE SYSTEM AND OBSERVATIONS FROM SPACE
K. A. Strand *In* ESRO Space Astrometry Mar. 1975 p 79-80 refs (For availability see N75-30957 21-89)

An outline of the currently available accuracies of stellar positions in a fundamental or absolute system is given. From what can be expected from ground based observational techniques in the near future, it appears that with the stated accuracies from Professor Lacroute's project in the Spacelab version of 0.001 arc sec for absolute positions and parallaxes, it is possible to obtain significant improvements in the fundamental reference system and its extension to fainter objects.
ESRO

N75-30967 Cagliari Univ. (Italy). Ist. di Astronomia.
PERIODIC AND QUASI-PERIODIC FLUCTUATIONS IN THE MOTION OF THE EARTH'S POLE c48
E. Proverbio and S. Uras *In* ESRO Space Astrometry Mar. 1975 p 83-93 refs (For availability see N75-30957 21-89)

Fluctuations in earth polar motions were studied by comparing theoretical and observed bandwidths for the different fluctuation periods. These periods, moreover, were correlated with the typical period of some natural phenomena. Analysis of the homogeneous series of coordinates Xi and Yi of the earth's rotational axis highlights the existence of periodic fluctuations in polar motion which could be associated with: complex nutation phenomena in the inner core of the earth (28 year period) or, in a mantle core coupling, possible disturbances of a gravitational nature bound to lunar precession (17.5 year period), or phenomena of a geophysical nature which might in some way determine a variation in the earth's product of inertia, with consequent variations in the position of the inertia pole (8.5 and 5.5 year periods).
ESRO

N75-30968 Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
CONSEQUENCES OF CATALOG IMPROVEMENT ON STUDIES OF THE EARTH-MOON SYSTEM [CONSEQUENCES DE L'AMELIORATION DE CATALOGUES SUR L'ETUDES DU SYSTEME TERRE-LUNE]
C. Meyer and M. Froeschle *In* ESRO Space Astrometry Mar. 1975 p 95-99 refs In FRENCH (For availability see N75-30957 21-89)

The progress to be expected from an improvement of stellar reference system is evaluated with regard to the determination of different parameters of the earth moon system. If the proposed space astrometry experiment can be repeated at intervals of a few years, it will be possible to investigate the residual rotation of the terrestrial reference system at near 0.02 arc sec, presently known with a precession of 0.15 arc sec. The best modern observations of occultations are obtained with a precision of 0.37 arc sec; the utilization of an improved catalog should allow the uncertainty to be reduced by 0.19 arc sec.
ESRO

N75-30969 Padua Univ. (Italy).
ASTROMETRIC POSITIONS OF THE PLANET PLUTO IN THE PERIOD 1971 - 1974
C. Barbieri, M. Capaccioli, and G. Pinto *In* ESRO Space Astrometry

Mar. 1975 p 101-102 refs (For availability see N75-30957 21-89)

The astrometric positions of the planet Pluto in the years 1971 to 1974 have been derived from 41 plates taken with the 67/92 cm Schmidt telescope. The precision of the positions, which are referred to an average number of 24 AGK3 stars, is 0.6 arc sec in right ascension and 0.4 arc sec in declination. A comparison is made between these results and the astrometric positions computed by Kaplan, Seidelmann and Smith. Good agreement is found, with a possible systematic difference of 0.6 arc sec in declination. Author (ESRO)

N75-30970 Observatoire de Paris (France).
EARTH ROTATION AND THE EARTH-MOON SYSTEM [LA ROTATION DE LA TERRE ET LE SYSTEME TERRE-LUNE]
F. Chollet *In* ESRO Space Astrometry Mar. 1975 p 103-106 refs In FRENCH (For availability see N75-30957 21-89)

The importance of an improved astronomical catalog is shown for earth rotation and the earth moon system studies. Present techniques for investigating earth rotation and the earth moon system are reviewed. The compilation of a catalog of a relatively high precision will allow reduction of the number of errors to three. ESRO

N75-30971 Astronomische Rechen-Institut, Heidelberg (West Germany).
TRIGONOMETRIC PARALLAXES: BASIC DATA FOR VARIOUS PROBLEMS
W. Gliese *In* ESRO Space Astrometry Mar. 1975 p 109-113 refs (For availability see N75-30957 21-89)

To date trigonometric parallaxes of somewhat more than 7000 stars have been measured, but only for 5% of them are the distances known with probable errors of less than 10%. Parallax work proposed by Lacroute could allow the calibration of luminosity relations, and an accurate determination of the Hyades parallax (an important basic distance for estimating the absolute magnitudes of giants and supergiants). A number of faint star parallaxes would allow the investigation of both the white dwarf problems and the red dwarf population in the vicinity of the sun. Author (ESRO)

N75-30972 Observatoire de Paris (France).
SOME ASTROPHYSICAL CONSEQUENCES OF AN IMPROVEMENT IN PARALLAXES
C. TuronLacarrieu *In* ESRO Space Astrometry Mar. 1975 p 115-120 refs (For availability see N75-30957 21-89)

The projects of space astrometry should yield an important improvement in trigonometric parallaxes for a very large number of stars. Three points are emphasized: (1) the limiting apparent magnitude will be much larger, the measurements of trigonometric parallaxes will then extend even to the coldest stars and allow calibrations for all types of stars; (2) the parallax measurements should allow us to reach larger distances from the sun; and (3) many more stars will be measured. This project could therefore provide statistically reliable samples of stars to be used for any calibration based on trigonometric parallaxes. Author (ESRO)

N75-30973 Sproul Observatory, Swarthmore, Pa.
UNSEEN COMPANIONS OF STARS
P. VandeKamp *In* ESRO Space Astrometry Mar. 1975 p 121-127 (For availability see N75-30957 21-89)

A survey is presented of the total population of unseen companions, based on a minute and selective sample. Chances of finding perturbations of short periods, say less than 10 years, diminish with increasing distance. Perturbations with longer periods, say less than 25 years or more, and for more distant stars can only be discovered by a series of observations spread over decades, if not centuries. It is clear that discoveries of companions of very small mass, say less than the generally adopted value of 0.06 M for the lowest mass of a normal star, and of planetary companions are most promising for the very nearest stars. There is reason therefore to strive for the highest possible positional accuracy for a limited number of the very nearest stars. ESRO

N75-30974 Royal Greenwich Observatory, Herstmonceux (England).
STELLAR KINEMATICS AND THE COSMIC DISTANCE SCALE
C. A. Murray *In* ESRO Space Astrometry Mar. 1975 p 129-134 refs (For availability see N75-30957 21-89)

An attempt is made to indicate where progress towards the improvement of the distance scale can be achieved by space astrometry, using both Lacroute's device and the large space telescope. Although very high spatial resolution will be attainable with the LST, to very faint magnitudes over fields of the order of 30 inch in diameter, it is by no means clear whether the hopes for accuracy of 0.0001 arc sec/a will be achieved in a reasonable time. ESRO

N75-30975# Stanford Univ., Calif. Radio Astronomy Inst.
STUDY OF THE THREE CENTIMETER RADIO FREQUENCY EMANATION FROM THE SOLAR ATMOSPHERE Interim Report
C. John Grebenkemper 29 Aug. 1974 20 p refs
(Contract F19628-74-C-0053; AF Proj. 7649)
(AD-A006125; SR-1; AFCRL-TR-74-0520) Avail: NTIS CSCL 03/2

Two-dimensional radio contour maps were made of McMath Regions 12397 and 12417 at a wavelength of 2.8 centimeters. On 3 July 1973, Region 12417 was found to have a radio diameter of 15 arc-seconds and a true radio brightness temperature of 5 million K. The thermal bremsstahlung and gyro-resonance emission mechanisms for the 2.8 centimeter slowly-varying component are discussed; the gyro-resonance emission is apparently dominant. The link between the high radio temperatures and solar flares is not clear, but the only regions to exhibit solar activity also had radio temperatures in excess of 5 million K. GRA

N75-30976# Army Foreign Science and Technology Center, Charlottesville, Va.
SOME PROBLEMS IN MODERN RADIOASTRONOMY
S. Ya. Braude 29 Oct. 1973 17 p Transl. into ENGLISH from Visnyk Akad. Nauk Ukrayins'Koyi RSR (USSR), no. 3, 1969 p 47-55
(AD-A005955; FSTC-HT-23-1587-73) Avail: NTIS CSCL 03/2

The way space objects emit radiation and scatter radiowaves is briefly reviewed. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-30977# Ministero degli Affari Esteri, Rome (Italy).
PROBLEMS ON THE ORIGIN AND EVOLUTION OF THE SOLAR SYSTEMS [PROBLEMI SULL'ORIGINE E L'EVOLUZIONE DEL SISTEMA SOLARE]
A. Coradini and C. Federico [1975] 74 p refs In ITALIAN; partly in ENGLISH
Avail: NTIS HC $4.25

Results of studying the solar system are reported. Topics discussed include: origin of the solar system and the accretion processes; evolution implications of the crators of Mars based on the Mariner 9 photographs; and physical and morphological characteristics of Mercury based on Mariner 10 data. F.O.S.

N75-30978# Hawaii Univ., Honolulu. Inst. for Astronomy.
NON-STELLAR SOURCES OF CELESTIAL BACKGROUND RADIANCE Final Report, 1 Aug. 1970 - 30 Jun. 1974
William M. Sinton Nov. 1974 19 p refs
(Contract F19628-71-C-0008; AF Proj. 7670)
(AD-A006127; AFCRL-TR-74-0569) Avail: NTIS CSCL 03/2

Observations of solar system objects obtained with the 61- and 224-cm telescopes on Mauna Kea are summarized. The programs have included studies of an 11.7/cm emission line in the earth's atmosphere, the 22-degree suspected halo in the Venus atmosphere, possible post-eclipse brightening of Io, observations of mutual occulations and eclipses of Galilean satellites, and radiometric observations at wavelengths of 20 micrometers and longer of Jupiter, Saturn, its rings, several Saturn satellites, and Trojan asteroids. GRA

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-30979*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
SPECTRAL LINE PROFILES FOR A PLANETARY CORONA
Joseph W. Chamberlain [1975] 16 p refs
(Grants NsG-7043; NSF GA-41788)
(NASA-CR-143320) Avail: NTIS HC $3.25 CSCL 03B

The Lyman and Balmer emission of a planetary corona depend on the exospheric temperature, the integrated column density of solar-illuminated hydrogen, and the region of phase space occupied by particles. Measurements of the intensity alone are incapable of defining the exosphere unambiguously. Line profiles, with high spectral resolution, can show whether a nonthermal component of the escaping hydrogen is present, and can indicate at what altitude satellite orbits of hydrogen atoms are depleted. Author

N75-30980*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PARTICLE MOTION IN ATMOSPHERIC BOUNDARY LAYERS OF MARS AND EARTH
Bruce R. White (Calif. Univ., Davis), James D. Iversen (Iowa State Univ. Sci. and Technol., Ames), Ronald Greeley (Santa Clara Univ., Calif.), and James B. Pollack Aug. 1975 208 p refs
(NASA-TM-X-62463; A-6210) Avail: NTIS HC $7.25 CSCL 03B

To study the eolian mechanics of saltating particles, both an experimental investigation of the flow field around a model crater in an atmospheric boundary layer wind tunnel and numerical solutions of the two- and three-dimensional equations of motion of a single particle under the influence of a turbulent boundary layer were conducted. Two-dimensional particle motion was calculated for flow near the surfaces of both Earth and Mars. For the case of Earth both a turbulent boundary layer with a viscous sublayer and one without were calculated. For the case of Mars it was only necessary to calculate turbulent boundary layer flow with a laminar sublayer because of the low values of friction Reynolds number; however, it was necessary to include the effects of slip flow on a particle caused by the rarefied Martian atmosphere. In the equations of motion the lift force functions were developed to act on a single particle only in the laminar sublayer or a corresponding small region of high shear near the surface for a fully turbulent boundary layer. The lift force functions were developed from the analytical work by Saffman concerning the lift force acting on a particle in simple shear flow. Author

N75-30981*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
SOME ASPECTS OF CORE FORMATION IN MERCURY
Sean C. Solomon Jun. 1975 38 p refs Presented at 1st Intern. Colloq. on Mercury, Jun. 1975 Submitted for publication
(Grant NsG-7081)
(NASA-CR-143322) Avail: NTIS HC $3.75 CSCL 03B

An evaluation of existing theories on the existence of the planet's metallic core is presented. Topics considered are: (1) magnetic fields; (2) surface geology; (3) cosmochemical models. J.R.T.

N75-30982*# Ohio State Univ. Research Foundation, Columbus.
CONTRIBUTION OF APOLLO LUNAR PHOTOGRAPHY TO THE ESTABLISHMENT OF SELENODETIC CONTROL Final Report
Athanasios Dermanis May 1975 74 p refs
(Contract NAS9-13093; OSURF Proj. 3487-A1)
(NASA-CR-144408; DGS-226) Avail: NTIS HC $4.25 CSCL 03B

Among the various types of available data relevant to the establishment of geometric control on the moon, the only one covering significant portions of the lunar surface (20%) with sufficient information content, is lunar photography, taken at the proximity of the moon from lunar orbiters. The idea of free geodetic networks is introduced as a tool for the statistical comparison of the geometric aspects of the various data used. Methods were developed for the updating of the statistics of observations and the a priori parameter estimates to obtain statistically consistent solutions by means of the optimum relative weighting concept. Author

N75-30983*# Lockheed Electronics Co., Houston, Tex.
SL-4 S-190 SPECTRORADIOMETRIC ACCURACY
Rose Anne Albrizio Jan. 1975 56 p ref
(Contract NAS9-12200)
(NASA-CR-141680; LEC-5315) Avail: NTIS HC $4.25 CSCL 03B

A procedure used for determining radiometric accuracy, consisting of two phases is presented. In the first phase a sensitometer was used as a calibrated radiometric target; while in the second, the moon was employed. Since the moon is a nonhomogeneous target whose radiometric signature is not as well-known as the irradiants of the sensitometer, the majority of this effort was directed towards the reduction and analysis of the sensitometric data. Author

N75-30984*# Joint Publications Research Service, Arlington, Va.
COMPARATIVE METEOROLOGY OF PLANETS
K. Ya. Kondratyev Washington NASA Jul. 1975 49 p refs Transl. into ENGLISH from Gidrometeoizdat (Leningrad), 1975 p 1-48
(NASA-TT-F-16441) Avail: NTIS HC $3.75 CSCL 03B

Literature on the comparative meteorology of the planets demonstrates that much can be learned about earth from an investigation of other planets. Much of the material is for Mars and Venus, for which the greatest amount of observational data is available from space probes. Insofar as information allows, the composition of the atmospheres and the properties of the underlying surfaces, the conditions for formation of the thermal regime of the atmospheres and cloud formation, and the characteristics of atmospheric circulation and processes in the upper atmosphere were investigated. Research methods are evaluated: direct measurements, remote sensing, laboratory modeling, and similarity theory. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-30985 British Library Lending Div., Boston Spa (England).
A SOVIET STRATOSPHERIC SOLAR OBSERVATORY
V. Krat 24 Oct. 1974 4 p Transl. into ENGLISH from Pravda (USSR), 1 Oct. 1974
(BLL-M-23672-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

A description of a large observatory equipped with a Cassegrainian telescope is presented. The origin of solar flares, and the effects of the sun's magnetic field on solar plasma is discussed. J.R.T.

N75-30986*# Hulburt (E. O.) Center for Space Research, Washington, D.C.
FINAL S020 SKYLAB EXPERIMENT REPORT
R. Tousey and D. L. Garrett Jul. 1975 34 p refs
(NASA Order T-87988)
(NASA-CR-144380) Avail: NTIS HC $3.75 CSCL 03B

After the loss of the meteroid shield required using the solar scientific airlock to erect the sun shade, methods were improvised to operate the S020 experiment on EVA's. Almost no data was obtained in the wavelength range 10 to 110 A. From 110 to 280 A the spectra were 10 to 100 time less intense than expected. A probable cause in loss of instrument sensitivity is the contamination of the filters by the spacecraft

coolant. A list of observed lines in presented. Although less data was obtained than expected, several lines not previously observed were recorded; and the spectra serve to confirm many very faintly observed weak lines recorded from sounding rockets by other experiments. Author

N75-30987*# Stanford Univ., Calif. Inst. for Plasma Research.
THE SOLAR ATMOSPHERE AND THE STRUCTURE OF ACTIVE REGIONS Semiannual Report, 1 Jan. - 30 Jun. 1975
P. A. Sturrock Aug. 1975 39 p refs
(Grant NGL-05-020-272)
(NASA-CR-143334; SAR-7) Avail: NTIS HC $3.79 CSCL 03B

Numerical analyses of solar activities are presented. The effect of these activities on aircraft and weather conditions was studied. Topics considered are: (1) solar flares; (2) solar X-rays; and (3) solar magnetic fields (charts are shown). J.R.T.

N75-30988*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE TOTAL AND SPECTRAL SOLAR IRRADIANCE AND ITS POSSIBLE VARIATIONS
Matthew P. Thekaekara Jun. 1975 33 p refs Presented at the Solar Constant Workshop, Big Bear Lake Obs., Calif., 19-21 May 1975
(NASA-TM-X-70944; X-912-75-155) Avail: NTIS HC $3.75 CSCL 03B

The present status of knowledge of the total and spectral irradiance of the sun is briefly reviewed. Currently accepted values of the solar constant and the extraterrestrial solar spectral irradiance are presented along with a discussion of how they were derived. Data on the variability of the solar constant are shown to be conflicting and inconclusive. Some of the alleged sun-weather relationships are cited in support of the need of knowing more precisely the variations in total and spectral solar irradiance. An overview of a solar monitoring program is discussed, with special emphasis on the Solar Energy Monitor in Space experiment which was proposed for several spacecraft missions. It is a combination of a solar constant detector and a prism monochromator. The determination of absolute values and the possible variations of the total and spectral solar irradiance, from measurements outside of the atmosphere is discussed. Author

N75-30989*# Aerospace Corp., El Segundo, Calif. Space Physics Lab.
THE X-RAY LINE AND CONTINUUM EMISSION FROM A SOLAR ACTIVE REGION Interim Report
Peter B. Landecker and Richard S. Wolfe 5 Mar. 1975 15 p refs
(Contracts NAS5-11362; F04701-C-74-0075; Grant NGR-33-008-125)
(NASA-CR-143383; AD-A009136; TR-0075(9260-02)-5; SAMSO-TR-75-95) Avail: NTIS HC $3.25 CSCL 03/2

The X-ray spectrum of the quiet sun in the energy range 2.3 - 6.9 keV was observed from an Aerobee rocket using an uncollimated graphite crystal spectrometer. These results and spatial measurements made with an onboard modulation collimator are analyzed using solar models. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-30990 Institut d'Aeronomie Spatiale de Belgique, Brussels.
THE CO FUNDAMENTAL BANDS IN THE SOLAR SPECTRUM
C. Muller and A. J. Sauval (Obs. Roy. de Belgique) 1975 25 p refs Submitted for publication
(Aeronomica-Acta-A-151-1975) Avail: Issuing Activity

The results of a study of CO lines in the * delta v equals 1 bands in the solar disk spectrum are presented. The photospheric spectrum is recorded using a balloon-borne spectrometer from 40 km altitude. From a comparison between the observed and synthetic solar spectra are compared. An agreement is shown using the best available solar and molecular data. Results are discussed and compared with other investigations and explain an apparent discrepancy among previous results. Author (ESRO)

N75-30991*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
ELECTRON PLASMA OSCILLATIONS ASSOCIATED WITH TYPE 3 RADIO EMISSIONS AND SOLAR ELECTRONS Progress Report
D. A. Gurnett and L. A. Frank Jul. 1975 42 p refs Submitted for publication
(Contracts NAS5-11074; NAS5-11431; NAS5-11039; NAS5-11064; N00014-68-A-0196-0009; Grants NGL-16-001-043; NGL-16-001-002)
(NASA-CR-143319; U-of-Iowa-75-25) Avail: NTIS HC $3.75 CSCL 03B

An extensive study of the IMP-6 and IMP-8 plasma and radio wave data was performed to try to find electron plasma oscillations associated with type III radio noise bursts and low-energy solar electrons. It is shown that electron plasma oscillations are seldom observed in association with solar electron events and type III radio bursts at 1.0 AU. For the one case in which electron plasma oscillations are definitely produced by the electrons ejected by the solar flare the electric field strength is relatively small. Electromagnetic radiation, believed to be similar to the type III radio emission, is observed coming from the region of the more intense electron plasma oscillations upstream. Quantitative calculations of the rate of conversion of the plasma oscillation energy to electromagnetic radiation are presented for plasma oscillations excited by both solar electrons and electrons from the bow shock. These calculations show that neither the type III radio emissions nor the radiation from upstream of the bow shock can be adequately explained by a current theory for the coupling of electron plasma oscillations to electromagnetic radiation. Author

N75-30992*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ATMOSPHERIC X-RAY EMISSION EXPERIMENT FOR SHUTTLE
R. A. Goldberg, K. L. Hallam, and J. G. Emming (Ball Brothers Res. Corp.) Aug. 1975 21 p refs Presented at the Proceedings of the 21st Annual Meeting of the AAS, Denver, Colorado, 26-28 Aug. 1975
(NASA-TM-X-70954; X-912-75-189) Avail: NTIS HC $3.25 CSCL 03B

An experiment designed to measure the spatial, temporal, and energy distribution of X-ray aurorae produced by precipitating electrons, is presented. The experiment will provide vital data on solar-terrestrial relationships that may lead to defining the transfer mechanism that causes certain terrestrial weather events and climatological behavior. An instrument concept is discussed, and is based on a spatially sensitive multiwire proportional counter, combined with collimators to produce X-ray images of the aurorae. An instrument pointing system, on which the counter can be mounted, will provide the required altitude control, and can be operated by a Spacelab payload specialist for full control over its observing and data taking modes. Author

N75-30993*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE INTERPLANETARY ACCELERATION OF ENERGETIC NUCLEONS
F. B. McDonald, B. J. Teegarden, J. H. Trainor, T. T. Von Rosenvinge, and W. R. Webber (New Hampshire Univ.) Jul. 1975 18 p refs Submitted for publication
(NASA-TM-X-70955; X-660-75-192) Avail: NTIS HC $3.25 CSCL 03B

Co-rotating proton and electron streams are the dominant type of low-energy (0.1-10 MeV/nucleon) particle event observed at 1 A.U. The radial dependence of these events was studied between 1 and 4.6 A.U. using essentially identical low-energy detector systems on IMP 7, Pioneer 10 and Pioneer 11. It was expected that at a given energy, the intensity of these streams

would decrease rapidly with heliocentric distance due to the effects of interplanetary adiabatic deceleration. Instead it was found that from event to event the intensity either remains roughly constant or increases significantly (more than an order of magnitude) between 1 and 3 A.U. It appears that interplanetary acceleration processes are the most plausible explanation. Several possible acceleration models are explored. Author

N75-30994*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF MAGNETOSPHERIC IONIZATION ENHANCEMENTS USING UPPER-HYBRID RESONANCE NOISE BAND DATA FROM THE RAE-1 SATELLITE
Stephen R. Mosier Aug. 1975 19 p refs Submitted for publication
(NASA-TM-X-70945; X-693-75-156) Avail: NTIS HC $3.25 CSCL 03B

Noise bands associated with the upper-hybrid resonance were used to provide direct evidence for the existence of regions of enhanced density in the equatorial magnetosphere near L = 2. Density enhancements ranging from several percent to as high as 45 percent are observed with radial dimensions of several hundred kilometers. The enhancement characteristics strongly suggest their identification as magnetospheric whistler ducts. Author

99 GENERAL

N75-30995# Bundesministerium der Verteidigung, Bonn (West Germany). Ruestungshauptabteilung.
CONTRIBUTIONS FROM MILITARY TECHNOLOGY [BEITRAEGE AUS DER WEHRTECHNIK]
Wolfgang Strathmann 1975 186 p refs In GERMAN; ENGLISH summaries
(BMVG-FBWT-75-12) Avail: NTIS HC $7.00; Bundeswehramt DM 46.50

Experimental investigations of two types of supersonic rotors, an impulse rotor and a shock in rotor configuration, are reported. A fatigue test program for life assurance of fighter aircraft is described, exemplified by the F-104G. Results of thermal boundary layer measurements in the Baltic Sea, using a thermistor cable, are discussed. Results are presented of investigations concerning the development of an electronically controlled phased array radar system. For individual titles, see N75-30996 through N75-30999.

N75-30996 Krupp (Fried.) G.m.b.H., Essen (West Germany).
DEVELOPMENT OF SUPERSONIC COMPRESSOR STAGES [ENTWICKLUNG VON UEBERSCHALLVERDICHTERSTUFEN] c07
W. Dettmering *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 14-43 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

Experimental investigations of two types of rotors, the supersonic impulse rotor and the rotor of 'shock in rotor' configurations, are reported. In the case of the first type, the measurement results fit the calculated design data. In the case of the second type, the agreement is not sufficient. The reasons for the deviations are discussed. Author (ESRO)

N75-30997 Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
LIFE ASSURANCE OF FIGHTER AIRCRAFT EXEMPLIFIED BY THE F-104 G [SICHERUNG DER LEBENSDAUER VON KAMPFFLUGZEUGEN DARGESTELLT AM BEISPIEL DER F-104 G] c05
T. Gaymann and H. J. Zocher *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 44-75 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

The fatigue life of the load carrying structure of modern fighter aircraft has caused some problems in the past 20 years in connection with the demand for advanced weapon techniques. The reasons for these problems are briefly discussed. Based on this experience and on the knowledge of numerous scientific investigations on the fatigue behavior of high strength materials and highly loaded structural components, a method has evolved to ensure the required fatigue life of modern fighter aircraft. The individual steps in the definition phase, the design phase, the qualification and the service phase are presented in block diagram form. The improvements to be attained in applying this method are demonstrated by the results of the fatigue integrity program carried out for the F-104 G in German. Author (ESRO)

N75-30998 Forschungsanstalt der Bundeswehr fuer Wasserschall- und Geophysik, Bonn (West Germany).
INVESTIGATIONS OF SUMMER TIME THERMAL BOUNDARY LAYER WITH A THERMISTOR TOW CABLE IN THE BALTIC SEA [UNTERSUCHUNGEN DER SOMMERLICHEN TEMPERATURSPRUNGSCHICHT MIT EINEM THERMISTORSCHLEPPKABEL IN DER OSTSEE] c48
K.-H. Keunecke *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 109-126 refs In GERMAN (For availability see N75-30995 21-99)

An expedition was carried out in the Baltic Sea to measure the spatial water temperature distribution with a specially developed thermistor tow cable allowing temperature measurements vertically from 80 cm to 55 m and horizontally at intervals from 30 to 300 m. The temperature field shows a strong spatial variation. The horizontal temperature field proves to be isotropic and no Doppler effects occur for ship speeds of 8 to 10 knots. The temperature distribution is largely stationary, at least in a length range of some 10 km. The observed structures are probably due to baroclinic instabilities. These deformations of the thermal layer are within the geostrophic balance. The typical drop of the spectral energy with the third power of the wave number is a further indication of the occurrence of a geostropic turbulence defined by Charney (1971). ESRO

N75-30999 Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
RECENT RESULTS OF ELECTRONICALLY CONTROLLED RADAR RESEARCH [NEUERE FORSCHUNGSERGEBNISSE ZUM ELEKTRONISCH GESTEUERTEN RADAR] c32
I. Groeger, E. Hanle, G. VanKeuk, W. D. Wirth, and L. F. Himburg (Bundesmin. der Verteidigung) *In* Bundesmin. der Verteidigung Contrib. from Mil. Technol. 1975 p 137-161 refs In GERMAN; ENGLISH summary (For availability see N75-30995 21-99)

The development of an electronically controlled phased array radar system is discussed. The fundamental problems concerning the antenna, radar control, signal processing, data processing, and overall system control are described. The theoretical background of an electronically controlled radar is detailed, and the results of a first experimental set-up are also reported ESRO

N75-31000# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
AIR FORCE AVIONICS LABORATORY TECHNICAL OBJECTIVE DOCUMENT, FISCAL YEAR 1975, PART 1
John V. Balch 1 Oct. 1974 43 p
(AD-A005730; AFAL-TR-74-213-Pt-1) Avail: NTIS CSCL 05/2

Technical Objective Documents (TODs) are prepared by the Air Force Laboratories for distribution by DDC to provide industry with Air Force objectives critical to maintaining aerospace superiority. This TOD prepared by the AF Avionics Laboratory describes the Technical Areas and the Technology Planning Objectives (TPOs) for meeting future Air Force avionics operational needs. Twelve (12) TPOs relating to the avionics for the five (5) Technical Areas of Target Destruction, Penetration Survival, Information Gathering, Systems Avionics, and Avionics Technology functions are discussed under related Goals and Technical Approaches. These planning objectives, goals, and approaches are taken from the laboratory's annual Technology Plan. GRA

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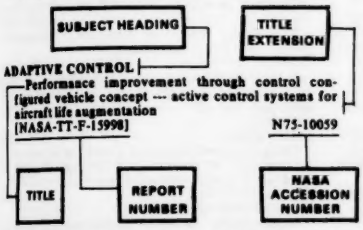

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Quarterly bulletin of the Division of Mechanical Engineering and the National Aeronautical Establishment, 1 January - 31 March 1975 --- marine navigation and technology
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World areas more humid than the canal zone during the wet season. Note 3 of studies to aid TECOM in analyses of environmental risks to materiel
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BIBLIOGRAPHIES
Aeronautical Engineering: A special bibliography with indexes, supplement 58
[NASA-SP-7037[58]] N75-29996
Space Indicator: Optical studies of the atmosphere -- scientific satellites/bibliographies
[NASA-TT-F-16265] N75-30222
Adiabatic shear: An annotated bibliography
[AD-A006490] N75-30307
Earth Resources: A continuing bibliography with indexes, issue 2 — remote sensors and data acquisition techniques
[NASA-SP-7041[02]] N75-30617
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Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 143
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Application of communications satellites to educational development — technology utilization/information systems - bibliographies
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Flow measuring apparatus
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The astrometric binary Mu Cas: Photographically almost resolved, and its implications on the primordial helium abundance — stellar mass
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Binocular attachment -- for display of numerical information in the field of view of the binoculars
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Preparation of an information brochure and exhibit of NASA technology applications — in the area of biomedical data and bioinstrumentation
[NASA-CR-144393] N75-30932

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Effect of 50-Hz fields on man
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Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 143
[NASA-SP-7011[143]] N75-30771

BIOMEDICAL DATA
Preparation of an information brochure and exhibit of NASA technology applications — in the area of biomedical data and bioinstrumentation
[NASA-CR-144393] N75-30932
Conditions and restrictions on the formulation of a human biometric data bank
[RAE-LIB-TRANS-1833] N75-30933

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Biological individuality of man
[AD-A008888] N75-30782

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Blood flow and pressure telemetry
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Radar ornithology: Bird echoes on weather and airport surveillance radars
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[AD-A008885] N75-30781
BLUNT BODIES
The effect of curvature discontinuities on the supersonic flow past axisymmetric blunt bodies
N75-30084
Coupled radiating shock layers with finite rate chemistry effects. Part 2: Analysis of the interaction of ablating protection systems and stagnation region heating — reentry effects
[NASA-CR-132735] N75-30213
Computer user's guide for a chemically reacting viscous shock-layer program
[NASA-CR-2551] N75-30470
BOARDS [PAPER]
Buckling of corrugated cardboard and ways of preventing it
[BLL-RTS-9752] N75-30590
BODIES OF REVOLUTION
Drag of streamline solids of revolution [transition at 0.1 body length behind nose]
[ESDU-BODIES-02.04.02] N75-30093
Three-dimensional laminar boundary layer over body of revolution at incidence. Part 8: The case of low incidence involving circumferential-flow reversal
[AD-A005696] N75-30485
Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 2: User's manual for STARS-2P digital computer program
[NASA-CR-2559-VOL-2] N75-30598
Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 3: Engineer's program manual for STARS-2P digital computer program
[NASA-CR-2559-VOL-3] N75-30599
Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 4: Satellite-1P program for STARS-2P digital computer program
[NASA-CR-2559-VOL-4] N75-30600
BODY MEASUREMENT [BIOLOGY]
In vivo measurement of human body composition
[NASA-CR-143375] N75-30774
BODY TEMPERATURE
Symposium on Temperature Regulation and Drug Action
[AD-A006372] N75-30780
BODY-WING CONFIGURATIONS
Experimental determination of interference effects of a slender wing-body configuration — using strain gage balances
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Determination of aerodynamic interference forces using the VFW-Fokker partial load method
N75-30117
BOILERS
Particulate emission control systems for oil-fired boilers
[PB-241277/3] N75-30681
BOILING
A study of heat transfer to boiling Freon 11 and 12 under different conditions of centrifugal accelerations
[BLL-M-23664-[5828.4F]] N75-30462
BOMBS [ORDNANCE]
The spherical bomb method for laminar burning velocity determination: Equations for thick flame propagation
[ISBN-0-85494-312-9] N75-30280
BONDING
Bonding method in the manufacture of continuous regression rate sensor devices
[NASA-CASE-LAR-10337-1] N75-30260
BOOSTER ROCKET ENGINES
Contributions to fluid mechanics and flight mechanics — also booster rocket engines, magnetohydrodynamic waves
[DLR-FB-74-62] N75-30082
Accuracy requirements of thrust direction and mounting of booster engines
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[AD-A008779] N75-30609
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Strength characteristics of boron aluminum composite subjected to combined stresses
[AD-A008781] N75-30613
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Numerical analysis of the inflammation phase in a turbulent mixing boundary layer
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Calculation of the effect of afterburning in external supersonic flow by means of a method of characteristics with heat addition and mixing layer analysis
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Turbulent boundary layer in hybrid propellants combustion
N75-30372
BOUNDARY LAYER FLOW
Supersonic turbulent boundary-layer flows with mass injection through slots and/or porous walls
[NASA-CR-2587] N75-30481
Experimental investigation of the wall effect on the readings of a hot wire anemometer
[AD-A008633] N75-30491
The article G. I. Taganova. About the second dispersive boundary layer and trace in viscous flow about body
[AD-A008637] N75-30495
A method for computing boundary-layer flows, including normal pressure gradient and longitudinal curvature effects
[AD-A008739] N75-30497
Laminar boundary layer on plate with the blowing-in of gas at acute angle to surface
[AD-A008630] N75-30498
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The wedge angle of laminar separation bubbles
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[AD-A009210] N75-30423
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Study of the three centimeter radio frequency emanation from the solar atmosphere
[AD-A006125] N75-30975
BROADCASTING
Map projections for planning of broadcasting services: Use of a digital computer
[BBC-RD-1975/21] N75-30380
Frequency-dependent limiters for FM sound broadcasting: Optimization of attack period and of delay-length in the variable de-emphasis stage
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BUBBLE TECHNIQUE
Cavitation research in Paris: Vive la difference
[AD-A006028] N75-30494
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The wedge angle of laminar separation bubbles
N75-30092
BUCKLING
Estimation of the local buckling stress under biaxial compression of an isotropic skin with fibre reinforced integral unflanged stiffeners
[ESDU-73015] N75-30589
Buckling of corrugated cardboard and ways of preventing it
[BLL-RTS-9752] N75-30590

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[NASA-TM-X-64953] N75-30638
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Redesign of a system to detect harmonic spin-flip Raman scattering in cadmium sulfide — using Argon laser
[AD-A008664] N75-30904
CALCIUM OXIDES
Investigation of the manufacture of building materials by carbonation hardening of slaked lime
[NRC/CNR-TT-1807] N75-30607
CALCIUM TUNGSTATES
Analysis of the ground configuration of 1 m 3+ in Ca WO4
[AD-A008968] N75-30285
CALCULATORS
Design and performance of a CCD memory system
[AD-A008657] N75-30453
CALIBRATING
Advanced flight test instrumentation: Design and calibration — for determining performance and aircraft stability and control
N75-30003
Calibration of platinum resistance thermometers using an intercomparison scheme
[COM-75-10525/4GA] N75-30523
Basic considerations of densitometer adjustment and calibration
[COM-75-10524/7] N75-30885
CALIFORNIA
Santa Barbara convective band seeding test program. Phase 2: 1970 - 1973 summary
[AD-A009094] N75-30748
CALIFORNIUM
Emission times and energy spectra of delayed neutrons produced by spontaneous fission of 252Cf
[BLL-RTS-9650] N75-30872
CAMERAS
Test star study of plate reductions obtained with the IAS triangulation camera
[AERONOMICA-ACTA-A-148-1975]
N75-30505
CANARD CONFIGURATIONS
Horizontal canards for two-axis CCV fighter control
N75-30033
CANTILEVER BEAMS
Behavior of cantilever beam under impact by a soft projectile — fan blade deflection under bird impact
[AD-A008778] N75-30610
CAPTURED AIR BUBBLE VEHICLES
Validation of the nonlinear six degree of freedom mathematical model of the XR-3 captured air bubble surface effect ship in calm water
[AD-A005868] N75-30122
CARBON
Investigation of the manufacture of building materials by carbonation hardening of slaked lime
[NRC/CNR-TT-1807] N75-30607
CARBON DIOXIDE
Tables and charts of equilibrium thermodynamic properties of carbon dioxide for temperatures to 25,000 K
[NASA-TM-X-72658] N75-30277
CARBON DIOXIDE LASERS
Spaceborne CO2 laser communications systems
[NASA-TM-X-70947] N75-30542
The role of gas flow and turbulence in electric discharge lasers
[TAE-245] N75-30544
Microwave waveguide modulators for CO2 lasers
[AD-A009101] N75-30551
Carbon dioxide electric discharge laser kinetics handbook
[AD-A008650] N75-30554
Laser damage phenomena in materials
[AD-A008879] N75-30555
A method of time resolving the mass spectrum produced by laser vaporization of solids
[AD-A008655] N75-30557
Measurement of the intensity of a vacuum ultraviolet source for application to photo-ionization in tea lasers
[AD-A009209] N75-30559
Acousto-optic beam sampler. Part 3: Diffraction experiments at 10.6 micrometers
[AD-A009070] N75-30561
CARBON FIBER REINFORCED PLASTICS
Summary report on the Carbon 72 Conference held in Baden-Baden, Germany, June 1972
[RPE-TM-614] N75-30261
Impact behavior of hybrid composites
[AD-A008936] N75-30267
CARBON FIBERS
Summary report on the Carbon 72 Conference held in Baden-Baden, Germany, June 1972
[RPE-TM-614] N75-30261
CARBON MONOXIDE
The CO fundamental bands in the solar spectrum
[AERONOMICA-ACTA-A-151-1975]
N75-30990
CARBON-CARBON COMPOSITES
Summary report on the Carbon 72 Conference held in Baden-Baden, Germany, June 1972
[RPE-TM-614] N75-30261
CARTESIAN COORDINATES
Transonic airfoil flowfield analysis using Cartesian coordinates
[NASA-CR-2577] N75-30100
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Aerodynamic measurements in cascades
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Aerodynamic theory for a cascade of oscillating airfoils in compressible subsonic flow
[AD-A008890] N75-30125
CASES [CONTAINERS]
Protected isotope heat source — for atmospheric reentry protection and heat transmission to spacecraft
[NASA-CASE-LEW-11227-1] N75-30876
CATALYSTS
Monopropellant engine investigation for space shuttle reaction control system. Volume 3: Improvement of metal foam for catalyst retention
[NASA-CR-144417] N75-30253

Catalytic activity in the reversion of an energy storing valence photoisomerization
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Synergestic and novel effects in composite solid propellant combustion
[AD-A006403] N75-30327

CATALYTIC ACTIVITY
Catalytic properties of surfaces sites on metal oxides and their characterization by X-ray photoelectron spectroscopy
[AD-A004916] N75-30283
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[AD-A008812] N75-30900

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Cavitation research in Paris: Vive la difference
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[AD-A005910] N75-30746
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[NASA-CR-141910] N75-30628
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[AERONOMICA-ACTA-A-151-1975] N75-30990
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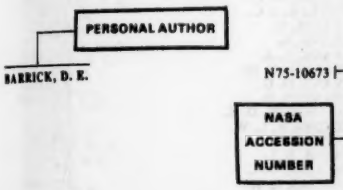

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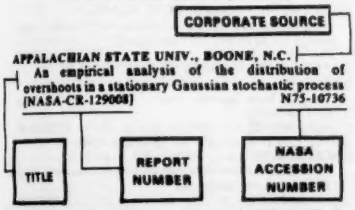
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BRITISH LIBRARY LENDING DIV., BOSTON SPA [ENGLAND].
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Inundation damage to vegetation at selected New England flood control reservoirs
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COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, PRETORIA [SOUTH AFRICA].
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[CSIR-TRANS-1214] N75-30302
Plan for the protection of EHV networks at the 1975 technical level
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The influence of porosity and grain size distribution on the permeability equation of porous flow
[CSIR-TRANS-1208] N75-30484
An automatic continuous flow ultramicroscopic analyzer for quantitative and dimensional determinators of particles suspended in liquid media
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A comparison between mapping of geological discontinuities and seismic measurements
[CSIR-TRANS-1199] N75-30706
Strain of human bodies protected by safety belts in simulated frontal crashes
[CSIR-TRANS-1196] N75-30779

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DEBELL AND RICHARSON, INC., ENFIELD, CONN.
Materials bonding
[AD-A009098] N75-30324
DECISION SCIENCE, INC., SAN DIEGO, CALIF.
An adaptive maneuvering logic computer program for the simulation of one-on-one air-to-air combat. Volume 1: General description
[NASA-CR-2582] N75-30817
DECISIONS AND DESIGNS, INC., MCLEAN, VA.
Automatic data processing strategy study. Volume 1: A summary of the findings
[PB-240903/5] N75-30807
Automatic data processing data study. Volume 2: Technology, history and evaluation
[PB-240904/3] N75-30808
DELAWARE UNIV., NEWARK.
Requirements for airborne laser systems used in coastal studies
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DENVER RESEARCH INST., COLO.
Broadband communications in rural areas. National cost estimate and case studies
[PB-241039/7] N75-30413
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Internal gravity waves generated by a moving source in a stratified fluid
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DEPARTMENT OF ENVIRONMENT, OTTAWA [ONTARIO].
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK [WEST GERMANY].
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN [WEST GERMANY].
Measurement of wing and tailplane loads on the model of the European Airbus A 300 B
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Experimental determination of interference effects of a slender wing-body configuration
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN [WEST GERMANY].
Application of advanced model-following techniques to the design of flight control systems for control configured vehicles
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, PORZ [WEST GERMANY].
Force measurements on tail assemblies of missiles
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Some problems and aspects in combustor modelling
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DEUTSCHE GESELLSCHAFT FUER LUFT- UND RAUMFAHRT, COLOGNE [WEST GERMANY].
Contributions to fluid mechanics and flight mechanics
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Force measurements on parts of wind tunnel models
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DORNIER-SYSTEM G.M.B.H., FRIEDRICHSHAFEN [WEST GERMANY].
Accuracy requirements of thrust direction and mounting of booster engines
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DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN [WEST GERMANY].
Determination of stability derivatives from flight test results comparison of five analytical techniques
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Air mobile utility distribution systems
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Evaluation and compilation of thermodynamic properties of high temperature chemical studies
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Research and development in the glass fiber sodium-sulfur battery
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DRAPER [CHARLES STARK] LAB., INC., CAMBRIDGE, MASS.
Dynamic testing of the Kearfott 2401 accelerometer
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DREXEL UNIV., PHILADELPHIA, PA.
Momentum transfer in hydrodynamically developing laminar flow in a straight channel
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DUKE UNIV., DURHAM, N.C.
Design of energy storage reactors for dc-to-dc converters
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E

E.O. PATON ELECTRIC WELDING INST., KIEV [USSR].
Underwater welding of metals
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ELECTROMASK, INC., WOODLAND HILLS, CALIF.
A photolithographic process to produce photomasks for surface wave transducers
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ELECTRONIC COMMUNICATIONS, INC., ST. PETERSBURG, FLA.
Circuit quality monitor
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ENERGY AND ENVIRONMENTAL ANALYSIS, INC., ARLINGTON, VA.
Projected regional energy availability in 1985
[AD-A008938] N75-30659

ENGINEERING SCIENCES DATA UNIT, LONDON [ENGLAND].
Drag of streamline solids of revolution [transition at 0.1 body length behind nose]
[ESDU-BODIES-02.04.02] N75-30093
Wave drag of wings at zero lift in inviscid airflow
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Characteristics of atmospheric turbulence near the ground. Part 3: Variations in space and time for strong winds [neutral atmosphere]
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ENVIRONMENTAL PREDICTION RESEARCH FACILITY [NAVY], MONTEREY, CALIF.
The Delaware-Dobson wave refraction model
[AD-A008841] N75-30766

ENVIRONMENTAL PROTECTION AGENCY, ARLINGTON, VA.
The role of EPA in regulating aircraft/airport noise
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ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA.
Infrared Fourier transform spectrometry of gas chromatography effluents
[PB-241304/5] N75-30293

ESL, INC., SUNNYVALE, CALIF.
A procedure for standardization of color infrared film response
[NASA-CR-2575] N75-30515

EUROPEAN RESEARCH OFFICE, LONDON [ENGLAND].
Implementation languages for real-time systems. Part 3: Command and control languages; specific comments
[AD-A009081] N75-30825

EUROPEAN SPACE RESEARCH ORGANIZATION, PARIS [FRANCE].
Space astrometry
[ESRO-SP-108] N75-30957

EXXON INTERNATIONAL CO., NEW YORK.
Sperry CAS collision avoidance system
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F

FACILITY CHECKING SQUADRON [1866TH] [AFCS], RICHARDS-GEBAUR AFB, MO.
TRACALS evaluation report, TACAN special evaluation report, Niagara Falls IAP, New York
[AD-A006141] N75-30140
Communications station evaluation report, Vance AFB, Oklahoma
[AD-A008798] N75-30416

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.
Convolution method of interference calculation. User's manual and results
[PB-241306/0] N75-30424
UCAP, UHK-TV Channel Assignment Program
[PB-241307/8] N75-30425

FEDERAL POWER COMMISSION, WASHINGTON, D.C.
Natural Gas Act, 1 March 1974
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FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, BETHESDA, MD.
Biological individuality of man
[AD-A008888] N75-30782

FLORIDA UNIV., GAINESVILLE.
Modular systems theory, design and analysis
[AD-A008976] N75-30457

FORSCHUNGSANSTALT DER BUNDESWEHR FUER WASSERSCHALL- UND GEOPHYSIK, BONN [WEST GERMANY].
Investigations of summer time thermal boundary layer with a thermistor tow cable in the Baltic Sea
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FORSCHUNGSINSTITUT FUER FUNK UND MATHEMATIK, WERTHOVEN [WEST GERMANY].
Recent results of electronically controlled radar research
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FREIE UNIV., BERLIN [WEST GERMANY].
Meteorological Data. Volume 141, no. 8: Results of synoptic services in 1974 daily and monthly weather charts [surface, 850 millibars, 500 millibars], tables and scientific notations, August
N75-30722

G

GCA CORP., BEDFORD, MASS.
Waste automotive lubricating oil reuse as a fuel
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Particulate emission control systems for oil-fired boilers
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GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Centaur propellant acquisition system study
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GENERAL DYNAMICS/FORT WORTH, TEX.
Chemically induced fires in aircraft electrical circuitry by glycol/water solutions. Hazard analysis and elimination methods
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GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Experimental clean combustor program noise measurement addendum, phase I
[NASA-CR-134853] N75-30177

GENERAL ELECTRIC CO., HOUSTON, TEX.
Skylab IMSS checklist application study for emergency medical care
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GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Urine sampling and collection system optimization and testing
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GENERAL ELECTRIC CO., SANTA BARBARA, CALIF.
Rationale and methodology for monitoring groundwater polluted by mining activities
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Investigation of ceramics for high temperature turbine vanes
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GENERAL ELECTRIC CO., WILMINGTON, MASS.
Vertical baragraph display
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Ionospheric modification: Its effects on radar and satellite communication systems
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Gravity data for Yellowstone-Island Park region, Idaho, Montana, Wyoming
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GEOLOGICAL SURVEY, RESTON, VA.
Ion-absorption band analysis for the discrimination of iron-rich zones
[E75-10380] N75-30619

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Kinetics of fluorine reactions
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Computability of global solutions to factorable nonconvex programs. Part 1: Convex underestimating problems
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GEORGIA INST. OF TECH., ATLANTA.
Synergestic and novel effects in composite solid propellant combustion
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Winds observed from May 1971 through October 1974 in the 77 to 194 km altitude region
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Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 2: User's manual for STARS-2P digital computer program
[NASA-CR-2559-VOL-2] N75-30598
Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 3: Engineer's program manual for STARS-2P digital computer program
[NASA-CR-2559-VOL-3] N75-30599
Numerical nonlinear inelastic analysis of stiffened shells of revolution. Volume 4: Satellite-1P program for STARS-2P digital computer program
[NASA-CR-2559-VOL-4] N75-30600

GRUMMAN AEROSPACE CORP., CALVERTON, N.Y.
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HALE OBSERVATORIES, PASADENA, CALIF.
Optical and infrared spectrophotometry of 18 Markarian galaxies
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Study of noise sources in a subsonic fan using measured blade pressures and acoustic theory
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Development of solid-state transportable satellite communications terminal
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Radar-modeling study
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Fluidic signal generator with independent bias pressure control
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Intervisibility beacon system, phase 1
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HARVARD UNIV., CAMBRIDGE, MASS.
Status of input design for aircraft parameter identification
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HAWAII UNIV., HONOLULU.
Wind engineering research digest, volume 1
[PB-241010/8] N75-30664
Non-stellar sources of celestial background radiance
[AD-A006127] N75-30978
HAWKER SIDDELEY AVIATION LTD., BROUGH [ENGLAND].
Active control technology: A military aircraft designer's viewpoint
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HELSINKI UNIV. [FINLAND].
Compressional wave power spectrum from seismic sources
[AD-A008961] N75-30716
HIDALGO [JOHN U.], INC., METAIRE, LA.
Research investigations in and demonstrations of remote sensing applications to urban environmental problems
[NASA-CR-143924] N75-30636
HONEYWELL, INC., BLOOMINGTON, MINN.
An investigation of PLZT for integrated optics
[AD-A009102] N75-30884
HONEYWELL, INC., HOPKINS, MINN.
Adiabatic shear: An annotated bibliography
[AD-A006490] N75-30307
HONEYWELL, INC., ST. PETERSBURG, FLA.
Autonomous navigation technology. Phase 1A: Study
[AD-A008649] N75-30143
HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Contamination control in hybrid microelectronic modules. Identification of critical process and contaminants, part 1
[NASA-CR-143380] N75-30434
Maximum data rate logic array development. Volume 2: Appendices
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The 10.6 micron parametric frequency converter
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HULBURT [E. O.] CENTER FOR SPACE RESEARCH, WASHINGTON, D.C.
Final S020 Skylab experiment report
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Transfer and use of training technology: A model for matching training approaches with training settings
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HYDRONAUTICS, INC., LAUREL, MD.
The pressure field of a vortex wake in ground effect
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I

IBM FEDERAL SYSTEMS DIV., GAITHERSBURG, MD.
Structured programming series. Volume 9: Management data collection and reporting
[AD-A008640] N75-30823
Structured programming series. Volume 10: Chief programmer team operations description
[AD-A008861] N75-30824
IIT RESEARCH INST., CHICAGO, ILL.
Lamination residual stresses in fiber composites
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Elf interference fields due to a finite line antenna
[AD-A008582] N75-30407
Atmospheric scavenging of hydrochloric acid
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ILLINOIS INST. OF TECH., CHICAGO.
Impact behavior of hybrid composites
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State-of-the-art for the inorganic chemicals industry: Commercial explosives
[PB-240960/5] N75-30332
ILLINOIS UNIV., SAVOY.
Basic attention measures as predictors of success in flight training
[AD-A006385] N75-30789
ILLINOIS UNIV., URBANA.
On minimax decision theory: A Banach space approach
[AD-A009092] N75-30418
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON [ENGLAND].
Numerical computation of practical combustion chamber flows
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INDIAN INST. OF SCIENCE, BANGALORE.
Accurate determination of stress concentrations around elliptical holes in cylindrical shells
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Stress concentrations around plain and reinforced holes in cylindrical and spherical shells
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INDUSTRIEANLAGEN-BETRIEBSGESELLSCHAFT M.B.H., OTTOBRUNN [WEST GERMANY].
Life assurance of fighter aircraft exemplified by the F-104 G
N75-30997
INFORMATICS, INC., ROCKVILLE, MD.
SOVRaD: A digest of recent Soviet R and D articles. Volume 1: Number 3, 1975
[AD-A009249] N75-30940
INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Test star study of plate reductions obtained with the IAS triangulation camera
[AERONOMICA-ACTA-A-148-1975]
N75-30505
Least squares method applied to astrometric plate reduction
[AERONOMICA-ACTA-A-149-1975]
N75-30506
On the problem of differential aberrations
[AERONOMICA-ACTA-A-150-1975]
N75-30507
Stable aurroral red arcs and their importance for the physics of the plasmapause region
[AERONOMICA-ACTA-A-141-1975]
N75-30691
A two-dimensional model of the stratosphere
[AERONOMICA-ACTA-A-146-1975]
N75-30692
Contribution to the study of ions in the polar ionosphere
[AERONOMICA-ACTA-A-147-1975]
N75-30693
A geomagnetic effect in the mean thermosphere
[AERONOMICA-ACTA-A-152-1975]
N75-30694
Solar extreme ultraviolet heating and dynamical processes in the mid-latitude thermosphere
[AERONOMICA-ACTA-A-153-1975]
N75-30695
The CO fundamental bands in the solar spectrum
[AERONOMICA-ACTA-A-151-1975]
N75-30990
INSTITUT SUPERIEUR D'ELECTRONIQUE DU NORD, LILLE [FRANCE].
Production of Rayleigh waves in non-piezo-electric materials and application to the study and detection of faults due to materials fatigue
N75-30592
INSTITUTO NACIONAL DE TECNICA AEROESPACIAL, MADRID [SPAIN].
The effect of pressure transients in diffusion flames
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INTERNATIONAL BUSINESS MACHINES CORP., HOPEWELL JUNCTION, N.Y.
Damage profiles in silicon and their impact on device reliability
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INTERNATIONAL COMBUSTION LTD., LONDON [ENGLAND].
The fabrication of deck nodes for North Sea oil drilling rigs
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IOWA GEOLOGICAL SURVEY REMOTE SENSING LAB.
Land classification of south-central Iowa from computer enhanced images
[E75-10394] N75-30627
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Electron plasma oscillations associated with type 3 radio emissions and solar electrons
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J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Refrigerated coaxial coupling
[NASA-CASE-NPO-13504-1] N75-30430
Electric power generation system directory from laser power
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JOHNS HOPKINS UNIV., BALTIMORE, MD.
Acoustic characteristics of twinning in indium
[AD-A009163] N75-30905
JOINT INST. FOR ACOUSTICS AND FLIGHT SCIENCES, HAMPTON, VA.
Summary of information on low-speed lateral-directional derivatives due to rate of change of sideslip beta prime
[NASA-TN-D-7972] N75-30190
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Data compression during telemetry
[JPRS-65415] N75-30224
Problems and general characteristics of data compression technology in modern telemetry
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[JPRS-65572] N75-30393
Space center electronic equipment
[JPRS-65382] N75-30436
Soviet bloc research in geophysics, astronomy, and space, no. 354
[JPRS-65461] N75-30616
Scientific research in power engineering
[JPRS-65422] N75-30648
History and development of USSR refining, petrochemical industry
[JPRS-65433] N75-30653
Effective loss factor in the D-region of the ionosphere during sudden ionospheric perturbations
[JPRS-65365] N75-30697
Meteorology and hydrology, no. 5, 1975
[JPRS-65338] N75-30724
Determination of the phase characteristics of clouds by satellite observations
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Forecasting the air temperature and pressure by the primitive system of equations of hydrothermodynamics considering orography
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Comparative meteorology of planets
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The lognormal frequency distribution of a random data flow
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Space Indicator: Optical studies of the atmosphere
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Effect of exogenous catecholamines on heart rate and thermoregulation in the hibernating hedgehog [Erinaceous europaeus L.].
[NASA-TT-F-16533] N75-30776
On the asymptotic properties of the solutions of the third-order linear differential equation
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KENTUCKY UNIV., LEXINGTON.
Mine survey and rescue B vehicle
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KRUPP [FRIED.] G.M.B.H., ESSEN [WEST GERMANY].
Development of supersonic compressor stages
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LABORATOIRE D'AEROTHERMIQUE DU C.N.R.S., MEUDON [FRANCE].
Quasi-equilibrium method for study of relaxed flow
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LABORATOIRE DE BIOPHYSIQUE, PARIS [FRANCE].
Mesomorphic materials used as phonon sensitive surfaces for real time hologram restitution
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LABORATORIO DE ACUSTICA E SONICA, SAO PAULO [BRAZIL].
Measurement and octave spectra of mechanical vibration in acceleration and displacement and of noise produced by air conditioning equipment installation
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Sound level measurement and analysis in industrial installations and in complaining neighbors. Legal situation
[TR-7504.780] N75-30869
LABORATORIUM FUER BETRIEBSFESTIGKEIT, DARMSTADT [WEST GERMANY].
Fatigue investigation of higher strength structural steels in notched and in welded condition. Synthesis of results and tentative conclusions
[TB-114[1974]] N75-30295
LEANDER MCCORMICK OBSERVATORY, CHARLOTTESVILLE, VA.
Astrometric experiments for the large space telescope
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LLOYDS REGISTER OF SHIPPING, LONDON [ENGLAND].
Design appraisal of offshore platforms of welded tubular construction
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LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
A recognition key to salt marsh mosquito [Aedes sollicitans] breeding areas in south Galveston County
[NASA-CR-144404] N75-30642
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[NASA-CR-141680] N75-30983
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M

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Report of the Materials Research Council [1974]
[AD-A008851] N75-30322
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MONSANTO RESEARCH CORP., ST. LOUIS, MO.
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N

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NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D.C.
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NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA [ONTARIO].
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Protected isotope heat source
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Fault tolerant clock apparatus utilizing a controlled minority of clock elements
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Proceedings of the 1974 Lyndon B. Johnson Space Center Wheat-Yield Conference
[NASA-TM-X-58158] N75-30615
Monterey Bay study
[NASA-SP-359] N75-30629

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WALLOPS STATION, WALLOPS ISLAND, VA.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
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System and method for tracking a signal source
[NASA-CASE-HQN-10880-1] N75-30385
Earth Resources: A continuing bibliography with indexes, issue 2
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Energy: A continuing bibliography with indexes
[NASA-SP-7043[04]] N75-30645
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 143
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NATIONAL AEROSPACE LAB., AMSTERDAM [NETHERLANDS].
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NATIONAL AEROSPACE LAB., TOKYO [JAPAN].
Comparative study of counting methods by digital simulation
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NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Electromagnetic attenuation properties of clay and gravel soils
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Thermodynamics of chemical species important to rocket technology
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Guide for the use of international system of units [SI] in federal information processing standard publications
[COM-75-50278/1] N75-30814
Basic considerations of densitometer adjustment and calibration
[COM-75-10524/7] N75-30885
Electrocaloric refrigeration for superconductors
[AD-A008852] N75-30909
National Bureau of Standards annual report: Fiscal year 1974
[COM-75-10465/3] N75-30948

NATIONAL CLIMATIC CENTER, ASHEVILLE, N.C.
Summary of synoptic meteorological observations for Great Lakes area. Volume 1: Lake Ontario and Lake Erie
[COM-75-10602/1] N75-30755

NATIONAL ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, N.C.
Measurement of the opacity and mass concentration of particulate emissions by mass transmissometry
[PB-241251/8] N75-30683

NATIONAL FIELD INVESTIGATIONS CENTER, DENVER, COLO.
Reconnaissance study of radiochemical pollution from phosphate rock mining and milling
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NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.
Ionospheric data
[COM-74-50087-355] N75-30721

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA [ONTARIO].
Quarterly bulletin of the Division of Mechanical Engineering and the National Aeronautical Establishment, 1 January - 31 March 1975
[DME/NAE-1975[1]] N75-30508

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D.C.
A preliminary analysis of aircraft accident data, US civil aviation, 1974
[PB-240915/9] N75-30133

NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
The effect of initial data uncertainties on the performance of statistical tropical cyclone prediction models
[COM-75-10483/6] N75-30756

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Climatology of Lake Erie storm surges at Buffalo and Toledo
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NAVAL AIR TEST CENTER, PATUXENT RIVER, MD.
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NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
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NAVAL MATERIAL COMMAND, WASHINGTON, D.C.
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NAVAL OBSERVATORY, WASHINGTON, D.C.
The fundamental reference system and observations from space
N75-30966

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A proposed strategy for the acquisition of avionics equipment
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High-current beams. Part 1: The western USSR research groups
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RAVEN INDUSTRIES, INC., SIOUX FALLS, S.DAK.
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RAYTHEON CO., SUDBURY, MASS.
Data analysis study and performance evaluation of the scanning laser Doppler system
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RCA LABS., PRINCETON, N.J.
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Summary report on the Carbon 72 Conference held in Baden-Baden, Germany, June 1972
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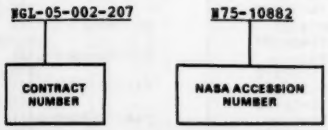

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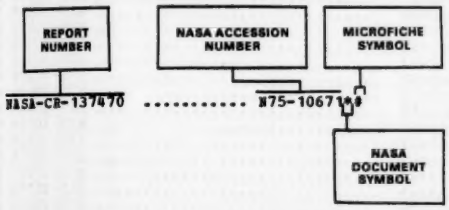

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AD-A008852 ..... N75-30909 #
AD-A008854 ..... N75-30614 #
AD-A008855 ..... N75-30444 #
AD-A008857 ..... N75-30126 #
AD-A008861 ..... N75-30824 #
AD-A008862 ..... N75-30443 #
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AD-A008982 ..... N75-30456 #
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AD-A008999 ..... N75-30848 #
AD-A009003 ..... N75-30546 #
AD-A009004 ..... N75-30908 #
AD-A009008 ..... N75-30419 #
AD-A009040 ..... N75-30678 #
AD-A009044/9 ..... N75-30183 #
AD-A009051 ..... N75-30680 #
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AD-A009054 ..... N75-30643 #
AD-A009055 ..... N75-30408 #
AD-A009056 ..... N75-30458 #
AD-A009057 ..... N75-30882 #
AD-A009058 ..... N75-30883 #
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AD-A009067 ..... N75-30663 #
AD-A009068 ..... N75-30399 #
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AD-A009079 ..... N75-30677 #
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AD-A009097 ..... N75-30765 #
AD-A009098 ..... N75-30324 #
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AD-A009105 ..... N75-30844 #
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AD-A009114 ..... N75-30445 #
AD-A009115 ..... N75-30401 #
AD-A009123 ..... N75-30292 #
AD-A009136 ..... N75-30989*#
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AD-A009154 ..... N75-30194 #
AD-A009155 ..... N75-30195 #
AD-A009156 ..... N75-30196 #
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AD-A009174 ..... N75-30939 #
AD-A009183 ..... N75-30930 #
AD-A009199 ..... N75-30929 #
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AD-A009204 ..... N75-30588 #
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AD-A009223 ..... N75-30822 #
AD-A009227 ..... N75-30560 #
AD-A009228 ..... N75-30458 #
AD-A009239 ..... N75-30259 #
AD-A009241 ..... N75-30311 #
AD-A009244 ..... N75-30881 #
AD-A009246 ..... N75-30750 #
AD-A009248 ..... N75-30581 #
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AD-A009250 ..... N75-30809 #
AD-A009252 ..... N75-30906 #
AD-A009269 ..... N75-30821 #
AD-A009276 ..... N75-30749 #
AD-A009298 ..... N75-30268 #
AD-A009326 ..... N75-30891 #
AD-A009329 ..... N75-30942 #
AD-A009336 ..... N75-30421 #

AEDC-TR-75-21 ..... N75-30497 #

AERONONICA-ACTA-A-141-1975 ..... N75-30691
AERONONICA-ACTA-A-146-1975 ..... N75-30692
AERONONICA-ACTA-A-147-1975 ..... N75-30693
AERONONICA-ACTA-A-148-1975 ..... N75-30505
AERONONICA-ACTA-A-149-1975 ..... N75-30506
AERONONICA-ACTA-A-150-1975 ..... N75-30507
AERONONICA-ACTA-A-151-1975 ..... N75-30990
AERONONICA-ACTA-A-152-1975 ..... N75-30694
AERONONICA-ACTA-A-153-1975 ..... N75-30695

AEWES-TR-S-75-2 ..... N75-30203 #

AFAL-TR-74-213-PT-1 ..... N75-31000 #
AFAL-TR-74-221 ..... N75-30459 #

AFAPL-TR-74-33 ..... N75-30330 #
AFAPL-TR-74-51-PT-1 ..... N75-30184 #
AFAPL-TR-74-104 ..... N75-30188 #
AFAPL-TR-74-113 ..... N75-30182 #

AFCRL-APSIG-295 ..... N75-30741 #

AFCRL-GRP-495 ..... N75-30740 #

AFCRL-PSRP-607 ..... N75-30545 #
AFCRL-PSRP-615 ..... N75-30548 #

AFCRL-TR-74-0282 ..... N75-30395 #
AFCRL-TR-74-0350 ..... N75-30937 #
AFCRL-TR-74-0476 ..... N75-30707 #
AFCRL-TR-74-0489 ..... N75-30741 #
AFCRL-TR-74-0494 ..... N75-30711 #
AFCRL-TR-74-0520 ..... N75-30975 #
AFCRL-TR-74-0532 ..... N75-30545 #
AFCRL-TR-74-0537 ..... N75-30708 #
AFCRL-TR-74-0569 ..... N75-30978 #
AFCRL-TR-74-0575 ..... N75-30442 #
AFCRL-TR-74-0590 ..... N75-30548 #

AFETR-TR-75-08 ..... N75-30745 #

AFFDL-TR-74-56-PT-1 ..... N75-30654 #
AFFDL-TR-74-56-PT-2 ..... N75-30655 #
AFFDL-TR-74-130-VOL-2 ..... N75-30134 #

AFFDL/FGC-TR-72-14 ..... N75-30153 #

AFML-TR-74-73 ..... N75-30577 #
AFML-TR-74-94 ..... N75-30610 #
AFML-TR-74-155 ..... N75-30609 #
AFML-TR-74-160 ..... N75-30305 #
AFML-TR-74-189-PT-1 ..... N75-30576 #
AFML-TR-74-214 ..... N75-30613 #
AFML-TR-74-281 ..... N75-30550 #
AFML-TR-75-21 ..... N75-30325 #

AFOSR-75-0177TR ..... N75-30744 #
AFOSR-75-0261TR-PT-8 ..... N75-30485 #
AFOSR-75-0266TR ..... N75-30304 #
AFOSR-75-0317TR ..... N75-30397 #
AFOSR-75-0330TR ..... N75-30790 #
AFOSR-75-0359TR ..... N75-30849 #
AFOSR-75-0361TR ..... N75-30496 #
AFOSR-75-0363TR ..... N75-30855 #
AFOSR-75-0364TR ..... N75-30457 #
AFOSR-75-0377TR ..... N75-30493 #
AFOSR-75-0381TR ..... N75-30549 #
AFOSR-75-0388TR ..... N75-30789 #
AFOSR-75-0389TR ..... N75-30555 #
AFOSR-75-0399TR ..... N75-30716 #
AFOSR-75-0400TR ..... N75-30612 #
AFOSR-75-0472TR ..... N75-30267 #
AFOSR-75-0474TR ..... N75-30803 #
AFOSR-75-0475TR ..... N75-30125 #
AFOSR-75-0479TR-PT-2 ..... N75-30914 #
AFOSR-75-0493TR ..... N75-30857 #
AFOSR-75-0495TR ..... N75-30126 #
AFOSR-75-0496TR ..... N75-30187 #
AFOSR-75-0497TR ..... N75-30848 #
AFOSR-75-0501TR ..... N75-30912 #
AFOSR-75-0502TR ..... N75-30290 #
AFOSR-75-0508TR ..... N75-30742 #
AFOSR-75-0509TR ..... N75-30781 #
AFOSR-75-0510TR ..... N75-30783 #
AFOSR-75-0522TR ..... N75-30782 #
AFOSR-75-0535TR ..... N75-30254 #
AFOSR-75-0536TR ..... N75-30266 #
AFOSR-75-0537TR ..... N75-30811 #
AFOSR-75-0538TR ..... N75-30406 #
AFOSR-75-0539TR ..... N75-30398 #
AFOSR-75-0540TR ..... N75-30836 #
AFOSR-75-0541TR ..... N75-30835 #
AFOSR-75-0542TR ..... N75-30831 #
AFOSR-75-0543TR ..... N75-30830 #
AFOSR-75-0545TR ..... N75-30938 #
AFOSR-75-0546TR ..... N75-30288 #
AFOSR-75-0547TR ..... N75-30614 #
AFOSR-75-0548TR ..... N75-30834 #
AFOSR-75-0552TR ..... N75-30833 #
AFOSR-75-0554TR ..... N75-30852 #
AFOSR-75-0555TR ..... N75-30851 #
AFOSR-75-0556TR ..... N75-30410 #
AFOSR-75-0558TR ..... N75-30854 #
AFOSR-75-0559TR-PT-2 ..... N75-30827 #
AFOSR-75-0561TR ..... N75-30846 #
AFOSR-75-0562TR-PT-1 ..... N75-30822 #
AFOSR-75-0577TR ..... N75-30456 #
AFOSR-75-0582TR ..... N75-30556 #
AFOSR-75-0584TR ..... N75-30832 #
AFOSR-75-0585TR ..... N75-30130 #
AFOSR-75-0586TR ..... N75-30136 #
AFOSR-75-0592TR ..... N75-30499 #
AFOSR-75-0595TR ..... N75-30587 #
AFOSR-75-0596TR ..... N75-30323 #
AFOSR-75-0598TR ..... N75-30289 #
AFOSR-75-0603TR ..... N75-30820 #
AFOSR-75-0606TR ..... N75-30837 #

AFOSR-75-0607TR ..... N75-30905 #
AFOSR-75-3590TR ..... N75-30310 #

AFWL-TR-73-291 ..... N75-30321 #
AFWL-TR-74-145 ..... N75-30135 #
AFWL-TR-74-216 ..... N75-30554 #
AFWL-TR-74-266 ..... N75-30444 #

AGARD-AG-204 ..... N75-30106 #
AGARD-AG-207 ..... N75-30471 #

AGARD-AR-80 ..... N75-30161 #

AGARD-CP-148 ..... N75-30052 #
AGARD-CP-157 ..... N75-30027 #
AGARD-CP-164 ..... N75-30359 #

AGARD-CR-172 ..... N75-29997 #

AGARD-LS-77 ..... N75-30166 #

AGARD-R-619 ..... N75-30198 #

AGARDOGRAPH-207 ..... N75-30471 #

AI-TR-294 ..... N75-30829 #

AIRESEARCH-75-11290 ..... N75-30250*#

AMMRC-TR-75-4 ..... N75-30907 #

AMRL-TR-75-13 ..... N75-30150 #

AML/ENG-75-02 ..... N75-30890 #

ARL-74-14/AFOSR-74-9 ..... N75-30789 #
ARL-74-0123 ..... N75-30845 #
ARL-75-007 ..... N75-30209 #
ARL-75-0005 ..... N75-30847 #
ARL-75-0006 ..... N75-30553 #
ARL-75-0020 ..... N75-30901 #
ARL-75-0021 ..... N75-30902 #

ARL/HE-NOTE-356 ..... N75-30162 #

ARO-VFK-TR-74-114 ..... N75-30497 #

ASD-TR-74-38 ..... N75-30181 #
ASD-TR-75-15 ..... N75-30157 #

ASI-TR-74-20 ..... N75-30130 #

ASR-2 ..... N75-30327 #

ATR-74(7341)-8-VOL-1 ..... N75-30233*#
ATR-74(7343)-VOL-1 ..... N75-30918*#
ATR-74(7343)-1-VOL-2 ..... N75-30919*#
ATR-74(7343)-1-VOL-2-APP-A ..... N75-30920*#
ATR-74(7343)-1-VOL-3 ..... N75-30921*#

A001AG ..... N75-30131 #

BBC-RD-1975/12 ..... N75-30383
BBC-RD-1975/21 ..... N75-30380
BBC-RD-1975/22 ..... N75-30382
BBC-RD-1975/23 ..... N75-30381

BLL-BTI-746-01482-(9022.401) N75-30294

BLL-CE-TRANS-6646-(9022.09) N75-30427
BLL-CE-TRANS-6689-(9022.09) N75-30770

BLL-M-23664-(5828.4F) N75-30462
BLL-M-23672-(5828.4F) N75-30985
BLL-M-25076-(5828.4F) N75-30463

BLL-PO-3178-(9022.81) ..... N75-30894 *

BLL-RISLEY-TR-2815-(9091.9F) N75-30270
BLL-RISLEY-TR-2860-(9091.9F) N75-30271

BLL-RTS-9420 ..... N75-30669
BLL-RTS-9629 ..... N75-30501
BLL-RTS-9650 ..... N75-30872
BLL-RTS-9676 ..... N75-30892
BLL-RTS-9680 ..... N75-30893
BLL-RTS-9752 ..... N75-30590

BLL-23574-(5828.4F) N75-30690

BM-OFR-23-75 ..... N75-30718 #
BM-OFR-24-75 ..... N75-30717 #
BM-OFR-27-75 ..... N75-30719 #

BM-RI-8018 ..... N75-30666*#

BMVG-FBWT-75-12 ..... N75-30995 #

BRL-MR-2453 ..... N75-30400 #

BRL-1770 ..... N75-30561 #

BR35625 ..... N75-30144
BR35634 ..... N75-30563 #
BR35869 ..... N75-30261
BR37106 ..... N75-30296 #
BR37554 ..... N75-30219
BR39427 ..... N75-30312
BR42287 ..... N75-30510 #
BR46337 ..... N75-30212 #
BR46637 ..... N75-30384 #
BR48030 ..... N75-30567 #
BR48032 ..... N75-30301 #
BR48101 ..... N75-30933 #
BR48208 ..... N75-30796 #
BR48209 ..... N75-30200 #
BR48248 ..... N75-30275 #
BR48249 ..... N75-30276 #

CA-HY-07-3134-2-74-01 ..... N75-30378 #

CALSPAN-ZL-5226-D-2 ..... N75-30379 #

CASD-NAS-75-023 ..... N75-30479*#

CDTCG-R(T)-75/3 ..... N75-30386*#

CEL-TM-1385 ..... N75-30581 #

CEL-TR-817 ..... N75-30765 #

CERL-TR-E-50 ..... N75-30675 #

CG-75/5 ..... N75-30931*#

CGR/DC-34-74 ..... N75-30763 #

CHSBE-7515 ..... N75-30844 #

COM-74-50087-355 ..... N75-30721 #
COM-75-10372/1 ..... N75-30141 #
COM-75-10465/3 ..... N75-30948 #
COM-75-10478/6 ..... N75-30950 #
COM-75-10483/6 ..... N75-30756 #
COM-75-10516/3 ..... N75-30461 #
COM-75-10522/1 ..... N75-30644 #
COM-75-10524/7 ..... N75-30885 #
COM-75-10525/4 ..... N75-30523 #
COM-75-10576/7 ..... N75-30757 #
COM-75-10581/7 ..... N75-30751 #
COM-75-10587/4 ..... N75-30754 #
COM-75-10598/1 ..... N75-30753 #
COM-75-10602/1 ..... N75-30755 #
COM-75-50278/1 ..... N75-30814 #

COO-2482-1 ..... N75-30496 #

CRL-T-799 ..... N75-30791 #

CRL-37 ..... N75-30811 #

CRREL-RR-327 ..... N75-30747 #

CRREL-SR-220 ..... N75-30679 #

CRREL-TL-468 ..... N75-30643 #
CRREL-TL-469 ..... N75-30286 #

CRREL-TR-249 ..... N75-30713 #
CRREL-TR-255 ..... N75-30414 #

CSIR-REF-1156 ..... N75-30514 #

CSIR-TRANS-1196 ..... N75-30779 #
CSIR-TRANS-1199 ..... N75-30706 #
CSIR-TRANS-1206 ..... N75-30394 #
CSIR-TRANS-1208 ..... N75-30484 #
CSIR-TRANS-1214 ..... N75-30302 #

CSL-50 ..... N75-30455 #

DF75AEE110 ..... N75-30160 #

DGS-226 ..... N75-30982*#

DLR-FB-74-62 ..... N75-30082 #

DLR-HITT-74-27 ..... N75-30201*#
DLR-HITT-75-02 ..... N75-30112 #

DNE/NAE-1975(1) ..... N75-30508 #

DNS-DR-2062-VOL-1 ..... N75-30238*#
DNS-DR-2062-VOL-2 ..... N75-30239*#
DNS-DR-2062-VOL-3 ..... N75-30240*#
DNS-DR-2149 ..... N75-30247*#
DNS-DR-2167 ..... N75-30237*#
DNS-DR-2192-VOL-2 ..... N75-30234*#
DNS-DR-2216 ..... N75-30246*#
DNS-DR-2250 ..... N75-30236*#

DNA-3466F ..... N75-30458 #

DOT-OPS-75-02 ..... N75-30578 #
DOT-OPS-75-03 ..... N75-30579 #

DOT-TST-75-76 ..... N75-30689 #

DS/PH/74-01 ..... N75-30899 #

D6-42494 ..... N75-30165*#
D210-10858-1 ..... N75-30146*#
D210-10858-2 ..... N75-30147*#
D210-10873-1 ..... N75-30145*#

E-8023 ..... N75-30649*#
E-8161 ..... N75-30298*#
E-8283 ..... N75-30564*#
E-8295 ..... N75-30565*#
E-8369 ..... N75-30257*#
E-8389 ..... N75-30262*#
E-8395 ..... N75-30606*#
E-8413 ..... N75-30220*#
E-8421 ..... N75-30650*#
E-8423 ..... N75-30176*#
E-8439 ..... N75-30635*#
E-8441 ..... N75-30175*#
E-8446 ..... N75-30605*#
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